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ABSTRACT

This publication contains many news items such as meeting and conference descriptions and dates, proposed and current legislative action, publication descriptions, and topical articles. The items all pertain to the impact on humanity of science and technology. In this issue, news items include NSF, NEH, and AAAS meeting and seminar notices, notices and descriptions of programs being offered at various universities, and descriptions of recent publications. Sections containing news from societies and a meetings calendar are included as are two feature sections. The first feature section deals with recombinant DNA, reviewing recent books, discussing the U.S. Senate interest in recombinant DNA research, and relating notes on a recent conference on recombinant DNA. The second section contains articles on professional ethics; these articles consider the role of the professional scientist in our society, and include a bibliography on professional ethics. A general bibliography is included. (MR)

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NEWSLETTER
ON

# SCIENCE, TECHNOLOGY, & HUMAN VALUES

January 1978
Number 22

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM.

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A few copies of earlier issues are still available.

For instructions to contributors, see inside back cover.

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NEWSLETTER ON SCIENCE, TECHNOLOGY & HUMAN VALUES

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To Our Readers:

The January, April, and June 1978 issues of the Newsletter on Science, Technology, and Human Values will be distributed without charge to

1) our present subscribers, and

2) other persons or institutions who have been identified as interested in the area of science and ethics.

If you do not wish to receive the April and June issues, please notify us immediately. If you have received more than one copy, please pass the extra Newsletter(s) on to a colleague.

Free distribution is made possible by a grant from the National Endowment for the Humanities.

# I. NEWS ITEMS

## A. Hastings Center Project on the Teaching of Ethics

The Hastings Center (Institute of Society, Ethics and the Life Sciences) has recently initiated a comprehensive study of the teaching of ethics in American higher education. Encompassing both the undergraduate and professional levels, the project is expected to take three years and is being conducted with support from the Rockefeller Brothers Foundation. The Hastings Center has provided the Newsletter with the following description of the project's rationale and objectives:

"The past few years have seen a staggering increase in the number of courses, programs, books and newsletters devoted to the subject of ethics. Factors such as Vietnam, Watergate, the rising costs of scientific research and medical care, and the civil rights movements of blacks, women and other minorities have forced educators to devote curricular attention to the nature of ethics, values, and morals in our society.

"In some instances entire disciplines have arisen to address the ethical conundrums and dilemmas of a specialized field or profession: i.e., bioethics, environmental ethics, technology and society programs, etc. In some cases traditional approaches to questions of values in the domains of the humanities and social sciences have been redirected toward addressing contemporary areas of contention. One need only think of the number of courses and books being utilized by philosophers, lawyers, historians, and sociologists on such diverse but thorny topics as animal liberation, the public policy issues raised by the energy crisis, the regulation of scientific inquiry, life-boat ethics, institutionalization of the deviant and so on. The moral problems of our day have entered the consciousness of educators and students and forced a reorganization and re-examination of the teaching of ethics in the undergraduate, graduate and professional school curriculum.

"Because of the increasing prominence of ethics in American higher education, this is a particularly propitious time to undertake a major systematic and reflective examination of the possibilities and pitfalls of introducing ethics in an explicit manner into education. The goals of the new Hastings Center project are threefold: (1) to analyze the possibilities and problems posed by current efforts to introduce ethics into the curriculum in both traditional and experimental ways; (2) to prepare a report that will survey current teaching of ethics and contain a critique of these efforts; and (3) to define some of the necessary components for programs designed to introduce ethics to students in various fields and professions.

"While particular subject matters may differ - say from medicine to public policy, or from environmental science to journalism - the problems of teaching ethics in these areas appear to be similar, if not identical. There are the same questions about competence to teach the subject, the same debates about whether ethics or values can or should be taught, the same pedagogical dilemmas, the same questions of motive, aim and intention, and the same possibilities for confusion, abuse and misunderstanding. It is also evident that regardless of the subject matter or profession most of the same substantive issues arise - the relationship between private and public morality, the rights of individuals vs. the rights of society, questions of discrimination, conflicting obligations and duties as a result of professional roles, issues of truth-telling, lying, deception, coercion, and debates about the possibility of universal versus contextual ethical norms and standards. In brief, despite the obvious differences between teaching undergraduate science majors and business school students, we feel that, prima facie, the teaching of ethics in itself raises sufficient general problems to permit fruitful inquiry into the subject.

"Our project, under the joint directorship of Daniel Callahan of the Hastings Center and Sissela Bok of the Harvard Medical School, will hold a series of meetings during the next two years for persons actively engaged in the teaching of ethics. The project has an Advisory Group composed of Derek Bok, President, Harvard University; Martin Trow, Director, Center for the Study of Higher Education, University of California at Berkeley; George Bonham, Editor-in-Chief, Change magazine; and Paul Freund, Professor of Law, Harvard University. A core group of experts and educators, and a large number of invited guests with special or unique teaching interests, will address some of the key problems raised in teaching ethics. Simultaneously, under the direction of Arthur Caplan, Associate for the Humanities at the Hastings Center, the project will compile information on courses, syllabi, bibliographies, professional meetings and programs. Ultimately, the project should be able to provide bibliographies and other pertinent information to persons with an interest in the teaching of ethics and to produce a set of critical studies on key themes. Sometime during 1979, the project will culminate with a workshop for educators, aimed at furthering the requisite skills and abilities for teaching in this area."

Project members welcome suggestions or substantive information regarding on-going programs or activities in the teaching of ethics at the college or professional school level. Inquiries or relevant information should be directed to: Arthur Caplan, Associate for the Humanities, Hastings Center, 360 Broadway, Hastings-on-Hudson, New York 10706.

B. Archive on Recombinant DNA Controversy

The MIT Oral History Program has announced the supplemental deposit of archival material on the recombinant DNA controversy, providing a full range of resources for the study of this important issue. The following materials are available for research in the Institute Archives at the Massachusetts Institute of Technology: (1) transcripts of tape-recorded interviews with scientists involved in the research; policy-makers and

advisors concerned with guidelines, regulations, and/or legislation; individuals who have publicly criticized or supported these efforts; and journalists; (2) documents including minutes, memoranda, correspondence, reports, and press clippings; and (3) tapes (audio and/or video) of meetings, public forums, conferences, and other events. Additions will be made to the collection as they are obtained during the course of the project, which is scheduled for final completion in summer 1978. The Recombinant DNA History Project is supported by the MIT Oral History Program and by a joint grant from the National Science Foundation (Program on Ethical and Value Implications of Science and Technology) and the National Endowment for the Humanities (Program of Science, Technology, and Human Values.) Charles Weiner, Professor of History of Science and Technology, is director of the project and Lynnette A. Maloney is project coordinator. (For further information, contact the Oral History Program, Room 20B-231, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, (617)253-4067.)

Materials presently available for research include:

Oral History Interviews. 224 hours of tape-recorded oral history interviews have been conducted with 86 participants from the United States and Europe. Forty-five transcripts (2,855 pages) are available for research in the Institute Archives; the balance of the interviews are currently being processed. Each transcript is accompanied by a table of contents.

Documents. Over 1600 documents are contained in the collection. These include minutes and notes from meetings and informal planning sessions, conference programs and proceedings, transcripts of hearings, manuscripts of individual points of view given in lecture or print, press releases of scientific and other concerned groups, committee reports, and drafts of research guidelines from several countries. The collection of correspondence includes 1600 photocopied letters obtained from the interviewees, organizations, and other donors. There are also 950 clippings from newspapers and periodicals, as well as technical reprints. A card index exists for all of these documents.

Audio and Video Tapes. Also on deposit in the Institute Archives are 225 audio and video tapes. Conference sessions, lectures, hearings, media broadcasts, city council meetings, and other events are among those recorded. Prominent among these are: the meetings of the National Institutes of Health Recombinant DNA Molecule Program Advisory Committee; the meetings of the Cambridge City Council and the associated Cambridge Laboratory Experimentation Review Board; and the University of Michigan Forum on Recombinant DNA Research.

Lists of the interview transcripts, documents, and tapes deposited are available from the Institute Archives upon request. Inquiries about use of the Recombinant DNA History Collection may be addressed to: Helen Slotkin, Institute Archivist, 14N-118, MIT Institute Archives, Cambridge, Massachusetts 02139, (617)253-5688.

C. Issue on "Limits of Scientific Inquiry" to be published by Daedalus

"Limits of Scientific Inquiry" was the title of a lively faculty seminar that held bi-weekly meetings during the past academic year at MIT, with the participation of faculty members in the Cambridge area, and commuters from New York, Cornell and Washington. The Seminar was run by Professors Gerald Holton and Robert S. Morison as one of the activities of MIT's new College for Science, Technology and Society. The President and the Provost of MIT were among the regular participants in the meetings. In his original letter of invitation, the Provost sounded the basic theme:

> The impulse to undertake this study, of which some precursors existed in recent MIT history, has a number of components. Some of these are practical and timely, such as the current discussion concerning the conditions for research on recombinant DNA or on human subjects. Others have their roots in basic, long-term, sociological or epistemological changes. Thus it is now maintained by many that scientists and scholars have long had a bargain with society by which they have produced ideas and devices with few constraints, but that now this bargain is in danger of breaking down or in need of revision. Understanding the extent and reasons for such changes should be of interest in its own right, and may also improve our ability to deal with practical problems some of us are now facing.

Papers presented and discussed at the seminar will form the core of the Spring 1978 March issue of the quarterly journal Daedalus. Among the authors of the essays are David Baltimore, Sissela Bok, Harvey Brooks, Barbara Culliton, Loren Graham, Gerald Holton, Peter Hutt, Leo Marx, Walter Metzger, Robert S. Morison, Dorothy Nelkin, Don K. Price, Robert Sinsheimer, Judith Swazey and Lynn White, Jr.

Correspondence concerning the issue should be addressed to Daedalus, Journal of the American Academy of Arts and Sciences, 165 Allandale St., Jamaica Plain Station, Boston, Massachusetts 02130.

D. NSF Science for Citizens Program, 1978

In 1978, the National Science Foundation Science for Citizens (SFC) program plans to award 15-25 Public Service Science Residencies, 15-25 Public Service Science Internships, and approximately 20 awards for forums, conferences, and workshops.

Public Service Science Residencies and Internships enable scientists and engineers and students of science and engineering to undertake up to a year's activities with citizen groups and other appropriate organizations in need of their expertise. Residents receive a stipend of $18,000 for a 12-month tenure, with current salary matched up to a maximum of $25,000; interns receive a $6,000 stipend for a 12-month tenure. Twenty-nine residency and internship awards were made during the first year of the program.

Public Service Science Residencies and Internships Brochure, SE 78-61, will be available January 1, 1978. Applications must be received by March 15, 1978, and awards will be announced in late June 1978.

Science for Citizens Forums, Conferences, and Workshops enable nonprofit organizations to bring together citizens and scientists to provide citizens with access to expertise on science-related policy issues and to better inform scientists as to those issues of concern to citizens. Nineteen proposals for forums, conferences, and workshops received awards during the first year of the program.

Science for Citizens Forums, Conferences, and Workshops Guide for the Preparation of Proposals, SE 78-63, will be available January 1, 1978. The deadline for receipt of preliminary proposals is March 1, 1978; formal proposals must be received by May 1, 1978. Awards will be made in August 1978.

Requests for copies of the announcements should be directed to Science for Citizens, Office of Science and Society, National Science Foundation, Washington, D.C. 20550, (202)282-7770.

E. NEH Summer Seminars for College Teachers

The National Endowment for the Humanities will sponsor 122 seminars in the humanities and the humanistic social sciences during the summer of 1978 under the aegis of its program of Summer Seminars for College Teachers. Twelve college teachers will be selected to participate in each seminar, and each will receive a stipend of $2,500.

The purpose of the program is to provide opportunities for faculty members of two-year, four-year, and five-year colleges to work under the direction of a distinguished scholar and to have access to the collections of a major research library.

To be eligible, applicants must be teaching either full-time or part-time at a private or public undergraduate institution or at a junior or community college. Preference will be given to those who have been teaching for at least three years and who have not recently had the opportunity to use the resources of a major library. Faculty members of departments which offer a doctorate will normally not be eligible for this program.

Seminars in the field of science, technology, and human values are listed below. For detailed information on particular seminars and for application instructions and forms, please write to the seminar directors at the addresses indicated. For a complete list of seminars to be offered across all disciplines, please write to the Division of Fellowships, National Endowment for the Humanities, 806 15th Street, N.W., Washington, D.C. 20506.

The application deadline is March 13, 1978.

"Concepts of Scientific Explanation," June 12 - August 4, 1978.
Peter Achinstein, Department of Philosophy, The Johns Hopkins University, Baltimore, Maryland 21218.

This seminar will consider arguments for and against three general approaches to scientific explanation: (1) formalistic accounts proposed by Hempel, Nagel, and Salmon; (2) contextual viewpoints held by Bromberger, Scriven, and Achinstein; and (3) historical relativism, expressed by Toulmin. Among the issues to be treated are: the relationship between explanation and prediction, whether absolute (theory-neutral) standards of scientific explanation are possible, and the ontological character of an explanation. The results of these studies will be applied to particular questions concerning micro-explanations in physics and chemistry, explanations in psychology, and functional explanations in biology and various social sciences. Open to philosophers and to natural and social sciences with some background in philosophy.

"The Medieval World View," June 15 - August 8, 1978.
Edward Grant, Department of the History and Philosophy of Science, Indiana University, Bloomington, Indiana 47401.

A detailed examination of the conceptual model of the physical universe that was developed during the late Middle Ages in the Latin West. Special emphasis will be given to the interaction between the demands of a pagan natural philosophy, drawn largely from the works of Aristotle, and the requirements and restrictions of a Judaeo-Christian theology; but the seminar will also examine other aspects of medieval thought - physical, spiritual, occult, and institutional - which contributed to the fully developed world view. Open to medievalists with backgrounds in history, philosophy, science, literature, theology, or art.

"Technology, Society, and Values in Twentieth-Century America," June 19 - August 11, 1978.
John G. Burke, Department of History, University of California, Los Angeles, California 90024.

This seminar will focus on technological innovation in the twentieth century in the context of the political and economic institutions of the United States, the values of society, and individual and national goals. Readings will treat such subjects as the relationship of technology to society, theories of technological change, social responsibility in the development and application of technology, governmental responsibility in

the process of technological choice, and technology and the future. Intended for teachers of introductory or advanced courses in history, social sciences, and humanities.

"The Functions of Discourse in Science and Literature," June 19 - August 11, 1978.
E. Fred Carlisle, Department of English, Michigan State University, East Lansing, Michigan 48824.

This seminar will examine the modes of discourse in science and in literature and try to arrive at an informed sense of their relationships and differences. Both orthodox formulations and recent modifications of these modes of discourse will be considered. Topics for discussion will include themes and paradigms in science, models and metaphors, style and discourse in science, the language of literature, and the value of reading scientific texts as literary texts are read. Intended for an interdisciplinary audience of teachers of writing, literature, and science.

"Liberty, Equality, and Fidelity in Bioethics," June 19 - August 11, 1978.
David H. Smith, Department of Religious Studies, Indiana University, Bloomington, Indiana 47401.

This seminar will survey a number of major topics in bioethics: experimentation on human subjects, the relationship between physician and patient, truth and confidentiality, eugenics, abortion, death and dying, and the distribution of medical resources. Special emphasis will be given to the difficulties involved in formulating a consistent method in normative ethics and on fiduciary relationships as loci of value. Intended for individuals with diverse backgrounds who deal with some aspect of bioethics in their teaching.

"On the Importance of History to the Philosophy of Science," June 26 - August 16, 1978.
Ian Hacking, Department of Philosophy, Stanford University, Stanford, California, 94305.

A study of the impact of the new historiography of science on the philosophy of science. Participants will consider the work of T.S. Kuhn, Imre Lakatos, and Paul Feyerabend, which calls into question assumptions about rationality made by logical empiricism. They will also investigate new approaches to the history of science that have consequences for the theory of knowledge, including the sociological studies of Robert Merton, Marxist sociology of knowledge, and Michael Foucault's Archaeology of Knowledge. Intended for teachers in philosophy and history.

"Intellectuals in Culture and Society," June 26 - August 18, 1978.
Edward Shils, Department of Sociology and Committee on Social Thought, University of Chicago, Chicago, Illinois 60637.

The first part of the seminar will deal with the role of intellectuals

and their institutions (universities, academies, publishers, libraries, learned societies, and so on) in the creation, maintenance, and transmission of intellectual works and beliefs in the humanities, sciences, and arts. The second part will treat the relationship between intellectuals and their society, focusing primarily upon the role of intellectuals within business enterprises, governments, and the political process. Attention will also be paid to the social backgrounds of intellectuals and to the process by which intellectuals are trained, and given recognition by society. Applicants should have an interest in the topic, but may come from any disciplinary background.

F. Kennedy to Introduce Legislation on Women in Science

Speaking on October 20, 1977 at a AAAS-sponsored conference of women scientists, Senator Edward Kennedy announced his intention to introduce legislation designed to increase the participation of women in science. Kennedy noted that women comprise just 10.4% of the nation's scientific workforce; that they earn less than men in every field and every level; and that the unemployment rate for women in science is 3 to 5 times higher than for men. He went on to state that:

> The virtual exclusion of women from careers in science and engineering is contrary to our national commitment to equal employment opportunity and weakens our nation's scientific research effort...To bring about the needed changes, we will need the full cooperation of the scientific community, our academic institutions, public and private employers, and the federal government.

Kennedy plans to introduce the legislation at the beginning of the new session of Congress in January. For additional information see "Women in Science: Breaking the Barriers," by Cheryl Fields, The Chronicle of Higher Education, 31 October 1977: 7-8.

G. NIH Issues Final Environmental Impact Statement on Recombinant DNA Guidelines

A comprehensive two-volume report, National Institutes of Health Environmental Impact Statement on NIH Guidelines for Research Involving Recombinant DNA Molecules, was issued by the NIH in October, 1977. Part I (137 pages) includes a summary of the environmental impacts of the June 1976 guidelines; objectives of the guidelines; technical information about the experimental process; historical background of the rDNA issue; description of the issues raised (possible hazards, expected benefits, long-range implications, possible deliberate misuse); description of the guidelines; alternative courses of action and the implications of each; environmental impacts of the issuance of the guidelines and of experiments conducted in accordance with them; responses to comments on the draft guidelines.

Part II consists of 17 appendices: included are a glossary; lists of references and documents; the NIH guidelines; institutions with biohazards committees; NIH-supported projects involving rDNA; instructions to investigators; public comments on the September 1976 draft Environmental Impact Statement; excerpts from several articles and the complete text of an essay by Rolf Freter, "Real and Imagined Dangers of Recombinant DNA Technology: The Need for Expert Evaluation" (to be published as a monograph by the University of Michigan Press).

The report is available for purchase (as a set only) from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock number is 017-040-00413-3. The price is $9.75.

H. Participation Encouraged in U.S./U.S.S.R. Science, Technology Activities

The U.S. side of the U.S./U.S.S.R. Joint Commission on Science and Technology is reviewing activities of the Working Groups under the Agreement on Cooperation in the Fields of Science and Technology (S&T Agreement) and in encouraging increased participation of U.S. scientists and engineers. The U.S. side is also seeking suggestions concerning the selection of new science and technology areas for possible cooperation with the Soviets.

The U.S. - Soviet S&T Agreement was renewed for a second five-year term in July, 1977. Originally signed in 1972, the main objective of the S&T agreement was to "provide broad opportunities for both parties to combine the efforts of their scientists and specialists in working on major problems whose solution will promote the progress of science and technology for the benefit of both countries and of mankind." Cooperation between the two countries involves the exchange of scientists, information and documents; joint development and implementation of projects in the basic and applied sciences; joint research, and joint conferences.

The ten active Working Groups of the S&T Agreement are: Computer Applications; Chemical Catalysis; Electrometallurgy; Forestry; Metrology; Microbiology; Physics; Science Policy; S&T Information; and Water Resources.

New areas of cooperation could involve either new Working Groups or new projects within the present Groups. Areas of cooperation suggested should meet the following criteria: provide opportunities for creative work with key Soviet scholars; fill in significant gaps in our knowledge of Soviet scientific and technical progress and/or unique resources; provide opportunities for useful joint research that involves sharing of facilities or research costs and access to unique natural features; and lead to potential commercial opportunities.

To receive additional information about the projects of Working Groups and ways to participate, or to suggest new cooperative areas, write to: Joint Commissions Working Group, INT, National Science Foundation, Washington, D.C. 20550.

I. AAAS Annual Meeting: Symposia of Special Interest

Over 130 symposia will be held at the 144th national meeting of the American Association for the Advancement of Science (AAAS), 12-17 February 1978 in Washington, D.C. Among the sessions that may be of particular interest to Newsletter readers are the following:

1) "Participation and Expertise in a Democratic Society," 3:00 p.m., Monday, 13 February, Shoreham Americana Hotel, Executive Room; Dorothy Nelkin, presiding.

Demands by citizens' groups for increasing participation in decisions about science and technology have drawn attention to the tension between democracy and the role of expertise. This symposium will explore various dimensions of this issue. Presentations will include the following:

"The Concept of a Citizens Court: The Cambridge Experimental Review Board," Sheldon Krimsky (Tufts University); "Airing Technical Arguments: The Science Court," Alan Mazur (Syracuse University); "The Scientist as Political Actor," Jerome Milch (Cornell University); "Public Impact on Technical Decisions in Federal Agencies," Daniel Metlay (Indiana University); "Participatory Experiments in Several European Countries," Dorothy Nelkin (Cornell University).

2) "The Reception of Unconventional Science by the Scientific Community," 3:00 p.m., Thursday, 16 February, Shoreham Americana Hotel, Diplomat Room; Seymour Mauskopf, presiding.

This symposium will explore the response of scientific communities to scientific unconventionality. The term "unconventionality" is meant to suggest developments which are regarded by segments of the scientific community - at least initially - as strange, aberrant or even threatening. It is hoped that through the case studies presented a composite picture of the process by which unconventional science is received and evaluated may begin to emerge. Presentations will include the following:

"The Reception of Acausality," Paul Forman (Smithsonian Institution); "The Reception and Acceptance of Continental Drift," Henry Robert Frankel (University of Missouri); "The Reception of Acupuncture," John Z. Bowers (The Josiah Macy, Jr., Foundation, New York); "The Controversy over Statistics in Parapsychology," Seymour Mauskopf (Duke University); and Marcello Truzzi, Discussant (Eastern Michigan University).

3) For programs of the three symposia sponsored by the AAAS Committee on Scientific Freedom and Responsibility, "Whistle-blowing and Scientific Responsibility: The Management of Technical Dissent," "Regulation of Scientific Inquiry: Societal Concerns with Research," and "Human Rights and Scientific Freedom: Are Scientists Special?", see Newsletter #21, page 11, or write Rosemary A. Chalk, Committee on Scientific Freedom and Responsibility, AAAS, 1776 Massachusetts Avenue, N.W., Washington, D.C. 20036.

J. Meeting of American Historians to Feature Sessions on Science

The meeting of the Organization of American Historians (OAH) to be held April 12-15 at the Statler Hilton Hotel, New York City, will include the following science-related sessions:

1) "Scientific Knowledge and Public Policy: Conflicts of Confidence," April 13, 2:30 p.m.; Chairman, Daniel Kevles (California Institute of Technology). Papers: "Scientists and the Public Interest," Alice Kimball Smith (Cambridge, Massachusetts); "Scientists in an Adversary Culture," Dorothy Nelkin (Cornell University). Discussants: Daniel Kevles and Peter Buck (Massachusetts Institute of Technology).

2) "Beyond Technological Determinism," April 14, 9:30 a.m.; Chairman, Langdon Winner (Massachusetts Institute of Technology). Papers: "Before the Fact: Social Choice in Machine Design," David F. Noble (Massachusetts Institute of Technology); "Alternative Criteria for the Design of Means of Production," Seymour Melman (Columbia University). Discussants: Langdon Winner and Jeremy Brecher (West Cornwall, Connecticut).

3) "Psychology in Good Times and Bad: The Growth and Contraction of a Science and Profession, 1917-1941," April 14, 2:30 p.m.; Chairman, Hamilton Cravens (Iowa State University). Papers: "The Expansion of Psychology after World War I: The Emergence of a Non-Academic Profession," Michael M. Sokal (Worcester Polytechnical Institute); "Psychologists and the Great Depression: The Organizational Response to Retrenchment," Lorenz J. Finison (Wellesley College). Discussant: Dorothy Ross (Princeton University).

4) "Organizing and Delivering Health Care in America: 1865-1920," April 15, 9:00 a.m.; Chairman, Morris Vogel (Temple University). Papers: "Georgia Freedman and the Politics of Health Care," Todd L. Savitt (University of Florida); "Neither for the Drawing Room or the Kitchen: Private Duty Nursing in Boston, 1880-1914," Susan Reverby, (Boston University); "Bedside Business: The Introduction of Management Ideals in the Progressive Era Hospital," David Rosner (Harvard University). Discussant: Morris Vogel.

5) "Taking the Pulse of Antebellum America: Health Related Journalists and Social Change, 1800-1860," Chairman, Ronald L. Numbers (University of Wisconsin). Papers: "Early American Health Editors and Their Journals: The Context of Public Issues and Demographic Change," James H. Cassedy (National Library of Medicine, Washington); "Orthodox Physicians as Propagandists of Health Reform: John Bell's Journal of Health, 1829-1833," Marion M. Torchia (Kensington, Maryland). Discussants: Ronald L. Numbers and Nathan Reingold (Smithsonian Institution).

K. Philosophy and Medicine Symposium: "Moral Use of New Knowledge in the Biomedical Sciences"

The Seventh Symposium on Philosophy and Medicine, "Moral Use of New Knowledge in the Biomedical Sciences," will be held at the University of

Missouri at Columbia, March 2,3, and 4, 1978. Major speakers will include Nicholas Rescher, Alasdair MacIntyre, John Duffy and Samuel Gorovitz. For further information, please contact: Professor William Bondeson, Director, College of General Studies, University of Missouri-Columbia, 420 General Classroom Building, Columbia, Missouri 65201, (314)882-3875; Professor H. Tristram Engelhardt, Jr., Kennedy Institute, Center for Bioethics, Georgetown University, Washington, D.C. 20057, (202)625-2371; or Professor Stuart F. Spicker, Department of Community Medicine and Health Care, the University of Connecticut Health Center, Farmington, Connecticut 06032, (203)-674-2354.

L. Boston Colloquium for the Philosophy of Science

Remaining sessions of the 1977-78 program of the Boston Colloquium for the Philosophy of Science are listed below. The Colloquium Program is sponsored by the Boston University Center for the Philosophy and History of Science, and sessions are open to all interested persons. All sessions begin at 7:45 p.m. The meetings of April 4 and May 2 will be held in the Conference Auditorium of the George Sherman Union, 775 Commonwealth Avenue, Boston, Massachusetts; all other meetings will be held in Room 314 of the Union. For additional information, contact: Robert S. Cohen, Department of Physics, Boston University, Boston, Massachusetts 02215, (617)353-2604.

"The Poverty of Empiricism, Or, Philosophy Vindicated," Laurens Laudan (University of Pittsburgh): January 17.

"On Attributing Causes to Complex Individuals," Benjamin Rogers (Wichita State): January 24.

"The Places of Experience," E.V. Walter (Boston University): February 7.

"Testing, Reform and Reaction: Three Endeavors of Arabic Astronomy," A.I. Sabra (Harvard University): February 14.

"Symmetries and Dualities in the Foundations of Ecological Science," Robert Shaw (University of Connecticut): February 21.

"Descartes and his Sixteenth Century Predecessors," Peter Machamer (University of Pittsburgh): February 28.

"Philosophy of Technology," (symposium): "Technology and the Transformation of Experience," Don Ihde (SUNY-Stony Brook); and "Technologies as Forms of Life," Langdon Winner (Massachusetts Institute of Technology): March 7.

"Dynamic and Linguistic Modes of Perception: A Cognitive Basis for Complementarity," Howard Pattee (SUNY-Binghamton): March 14.

"Evidence, Inference and the Law," Marsha Hanen (University of Calgary): March 28.

"The Question of Relativism in the Social Sciences," Daniel Bell (Harvard University): April 4.

"The Marxist Concept of Religion: A Scientific and Philosophical Study," Lev Mitrokhin (Institute of Philosophy, Academy of Sciences of the USSR): April 11.

"Science and Ideology: Some Themes from the Recent Marxist Discussion of Science and Ideology," John J. Stachel (Boston University): April 18.

"The World of Arthur Stanley Eddington: Science and Its Audience," Loren Graham (Columbia University): April 25.

"Esthetic Rationality," Herbert Marcuse (University of California): May 2.

M. Cornell STS Program Postdoctoral Associateships, and Faculty Position

The Cornell University Program on Science, Technology and Society (STS) has Postdoctoral Associateships available for 1978-79, for persons who wish to focus on one of the following areas:

Citizen Participation in Technological Decision-Making - the underlying problems posed by the increasingly technical nature of public policy decisions; the conflict between democracy and expertise in a technological society.

Law and Society - the role of the courts in technological decision-making; the use of litigation to resolve public policy disputes.

Science, Technology and Public Policy - energy and environmental policy; economic analysis of research and development; the application of technology to national development of the poorer countries.

Humanities, Science and Technology - literary, historical or philosophical studies in science, technology and society; environmental and biomedical ethics; theory of choice and decision.

Technology Assessment of Telecommunications - the social impacts likely to result from the introduction of new technologies; long-range policy implications of emerging technologies.

Applications are invited from young scholars with disciplinary backgrounds in the physical, biological and social sciences; the humanities; engineering; business and public administration; and law. It is likely

that two appointments will be made. The appointments are primarily research-oriented, but in most cases there is an opportunity to participate in some classroom teaching. The appointments are for 12 months beginning either July or September 1978, with possible renewal for an additional year. The normal starting salary will be in the range of $11,500 - $13,500, depending upon qualifications.

Applications should include: (1) An account of the proposed research project (approximately 5 pages); (2) A curriculum vitae, summary of the doctoral dissertation, and list of courses taught; and (3) Three letters of reference (sent directly to the Program).

Application materials should be sent to: Lloyd Carter, Manager, STS Program, Cornell University, Ithaca, New York 14853. Deadline for applications is February 17; awards will be announced March 15.

Also available in the STS Program is an Assistant Professorship in Science and Technology Policy. The Program is seeking a scholar actively involved in research on the social and political bases for the development of policies for science and technology, or on the impact of science and technology on public policy. Responsibilities will include the development of new courses in these areas and participation in research, including the training of graduate students. Applicants should have a Ph.D. in political science or a related field.

The appointment will be for a three-year term beginning September 1978. The starting salary will be commensurate with qualifications.

Applications should include: (1) A description of teaching interests and an account of research interests, including specification of a potential research project; (2) A complete curriculum vitae including a summary of the doctoral dissertation and a list of courses taught. Manuscripts and offprints may be included; and (3) Three letters of reference (sent directly to the Program).

Application materials should be sent to: Lloyd Carter, Manager, STS Program, Cornell University, Ithaca, New York 14853. Deadline for applications is February 17.

N. Rensselaer Polytechnic Institute Offers Master's Program in Science, Technology and Values

The Center for the Study of the Human Dimensions of Science and Technology of Rensselaer Polytechnic Institute offers a Master of Science degree in Science, Technology, and Values. Candidates are encouraged to design individualized programs. The degree program can be used to broaden the experience of those with undergraduate training in professional fields, such as engineering, management, or science education, who wish to increase their understanding of the interactions between science/technology and human cultures. It can also serve as a specializing program for those

with general backgrounds in philosophy, journalism, history, etc. Possible programs include: a concentration in the history and philosophy of science in preparation for a Ph.D. program in that area; a concentration on the social and cultural dimensions of technology as background for a career in law, public policy or management; and a concentration on the ethical and social dimensions of medicine as background for work in health services. Students may work simultaneously on this MS degree and a degree in another field such as management or engineering.

Research Assistantships and tuition scholarships are available for the 1978-79 academic year. For further information, contact: Dr. Robert J. Baum, Director, Center for the Study of the Human Dimensions of Science and Technology, Rensselaer Polytechnic Institute, Troy, New York 12181, (518)270-6574.

O. University of Maryland Center for Philosophy and Public Policy

The Center for Philosophy and Public Policy at the University of Maryland was established in 1976 for the purpose of "investigating the conceptual and ethical aspects of public policy formulation and debate." A joint program of the Departments of Philosophy and Government and Politics, the Center engages in research and curriculum development.

Research efforts, selected from topics "expected to be a focus of public policy debate during the next decade," are conducted cooperatively by working groups of philosophers, policy-makers and analysts, and others. Studies currently underway include "Human Rights and Foreign Policy," "Conceptual and Ethical Issues in Income Maintenance," and "Reforming the Injury Reparations System."

The Center also prepares and disseminates model courses for use in public policy programs as well as in traditional academic departments. Two model courses are now available: "Hunger and Affluence" provides an empirical account of the world food problem and analyzes the ethical assumptions implied in possible responses to that problem. "Distributive Justice and Public Policies" looks at three different theories of distributive justice and traces their implications for three sets of policies: income distribution, environmental degradation, and health care. Each model course packet is about 15-20 pages in length and contains suggested sets of readings and an annotated bibliography.

The model courses are available free of charge and may be obtained by writing to: Dr. Peter Brown, Director, Center for Philosophy and Public Policy, University of Maryland, College Park, Maryland 20742.

P. President Extends National Commission for the Protection of Human Subjects

The National Commission for the Protection of Human Subjects has been extended for an additional six months by Public Law 95-203, signed by President Carter on November 23, 1977.

The Commission has scheduled meetings through April 1978. Its final report will be submitted to the Secretary of the U.S. Department of Health, Education and Welfare (HEW) by September 30, 1978, and the Commission will officially cease to exist on October 31, 1978.

Commission members expect to complete six additional reports, including recommendations on research involving those institutionalized as mentally infirm, the performance of Institutional Review Boards, basic ethical principles, the application of ethical principles to the delivery of health services by HEW, advances in biomedical and behavioral research and technology, and research not subject to regulation by HEW. The Commission has completed five reports, to date.

The commission was originally authorized by the National Research Act, Public Law 93-348, to meet for a two-year period which ended on December 31, 1976. It was extended to December 1977 by Public Law 94-573, dated October 21, 1976.

Q. NSF Publications

Two reports in NSF's series, Science Resources Studies Highlights, are now available. (1) "Defense and Energy Spur Federal R&D Growth from FY 1974 to FY 1978" (NSF 77-30) reports that, between fiscal years 1974 and 1978, Federal funding for research and development will have risen significantly, after showing only slight growth in the 1969-74 period. Citing the 1978 budget, the report states that Federal funding for energy R&D is expected to show a 17% rise over 1977, the greatest relative growth of any major function. In terms of the total Federal R&D budget for 1978, the nine leading functions are: national defense (49%); space (12%); energy (11%); health (10%); environment (4%); science and technology base (4%); natural resource and agricultural products (each 2%).

(2) "Aptitude Test Scores of Prospective Science Graduate Students Remained Essentially the Same from 1970 to 1975" (NSF 77-318) reports the results of a study conducted by the Educational Testing Service (ETS). ETS compared the results of verbal and quantitative aptitude tests at the graduate level for applicants in science and non-science fields. The math scores of candidates in science and engineering fields was significantly higher than those for candidates in non-science fields; in verbal ability, science and non-science candidates did not differ on the average, but within the science group, engineering candidates averaged lower than the others.

The above reports, as well as the full text from which the latter set of highlights were taken, Trends in Aptitudes of Graduate Students in

Science, (published by the Educational Testing Service), may be obtained without charge by writing to: Division of Science Resource Studies, National Science Foundation, 1800 G. Street, N.W., Washington, D.C. 20550.

Also available is the National Science Foundation's Guide to Programs for FY 1978. The 69-page publication includes a description and purpose of each program; eligibility requirements; closing dates; and addresses from which information or application forms may be obtained. The Guide to Programs may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for $2.20. Stock number is 038-000-00342-9.

R. Recent Publications on Engineers and Society, Engineering Education

Engineering, Technology and Society presents the proceedings of the 1976 meeting of the General Section of the British Association for the Advancement of Science. Among the contributors are industrialists, educators and members of government. The contents are: "Putting Technology to Work," by Sir Ieuan Maddock; "Appropriate Technology for Britain," by Dr. Jeremy Bray, MP; "The Application of Technology to Marketable Products in Smiths Industries," by W.A. Mallison; "Research and Development - Beecham Pharmaceuticals," by Dr. M.J. Soula; "Philips - a Pioneer - High Technology," by Dr. P.E. Trier; "Transnational Investment in the UK Economy," by Professor W.G. McClelland; "Engineering Technology and Economic Viability," by Dr. J.A. Pope; "The Status of Engineers and their Contribution to Society," by L. Landon Goodman; and "Education and Economic Well-Being," by Sir Alex Smith.

Engineering, Technology and Society is available for the dollar equivalent of L2.75 (including postage). Inquiries and orders should be addressed to: Dr. G.P. Thomas, Recorder BA General Section, Department of Extra Mural Studies, University College of Swansea, Singleton Park, Swansea, SA2 8PP England.

Modern Engineering Education is the theme of the October/December 1977 issue of the UNESCO-sponsored journal, Impact of Science on Society (vol. 27, no. 4). An international group of authors has contributed essays on "Teaching Today for Tomorrow's Needs," "An Engineering Professor's Dilemma," "The Experience of Mali in Training Engineers," "Ensuring the Success of Engineering Training," and "Problems in Quality of Education." In the U.S., Impact is distributed by Unipub, Box 433, Murray Hill Station, New York, New York 10016.

S. French Interdisciplinary Group for Studies in Science and Society

An interdisciplinary research group for the study of the interactions of science and society was founded four years ago at the Université Louis Pasteur in Strasbourg, France. Known as GERSULP (Groupe d'étude et de

recherche sur la science de l'Université Louis Pasteur), the organization consists of natural and social scientists and has organized several series of seminars: "Social Responsibility of Scientists" (6 sessions, 1974); "Science, Technology and the State" (6 sessions, 1975); "Exact Sciences, Social Sciences" (14 sessions, 1976); "Science in the Third World" (15 sessions, 1977). Papers delivered at the seminars are disseminated through the group's new bulletin, ERIS, Études Interdisciplinaires sur la Science. Published in French, subscriptions for 10 issues of ERIS are available for $10.00 and may be obtained by writing to: Phillipe Breton, 4 rue Blaise Pascal, 67070 Strasbourg, France.

T. AIP Publishes Physics News in 1977

Physics News in 1977 is the latest edition of the American Institute of Physics' series of annual booklets designed to call attention to interesting and newsworthy developments in physics and its related fields. The booklets are prepared particularly for science writers as background sources for future developments, but the summaries will be useful to others as well. Chapters cover developments in different sub-fields, AIP and AIP member society awards, and the Nobel Prize. Physics News in 1977 is available for $1.00 (prepaid) from: Public Relations Division, American Institute of Physics, 335 East 45th St., New York, New York 10017.

U. NEH Awards for Science - Values Projects, Fiscal Year 1977

The National Endowment for the Humanities awarded 49 grants for projects in the science, technology and human values field during fiscal year 1977. Of the total, 17 awards went to educational institutions for the development of courses and curricula, while 5 awards were made to public institutions - primarily museums - for the preparation of exhibits and educational forums. Research grants and Fellowships are listed below.

Division of Research Grants:

Frederick Burkhardt. American Council of Learned Societies, Washington, D.C.
"Charles Darwin's Correspondence"
For the preparation and editing of Darwin's letters.

Gerald Holton, Harvard University, Cambridge, Massachusetts.
"Thematic Analysis as a Technique in Historical Studies of Science"
A systematic study of thematic analysis as a conceptual tool in the history of modern science.

Division of Fellowships:

Robert E. Kohler, University of Pennsylvania, Philadelphia, Pennsylvania.
"A Social History of Biochemistry and Molecular Biology, 1895-1965"

A comparative study (Britain, Germany, United States) of the social relations of biochemistry with its host institutions (universities, professional schools) and its patrons and clients (foundations, government agencies, industry).

Philip Singer, Oakland University, Rochester, Michigan.
"Medical Model vs. Cultural Model: Four Films of Traditional Healing in Nigeria." To record on film, for the first time, Nigerian Traditional Healers engaged in bone mending, divination, herbal compounding, and hospital care.

Mark Seldon, Washington University, St. Louis, Missouri.
"Man and Technology in the Chinese Development Strategy"
To produce a volume tracing the development of political ideas which have shaped China's development strategy. A motivating feature of this strategy is the redefinition of the relationships between human beings and technology, between human beings and nature, and among individuals.

Bernadette J. Bucher, Fordham University, New York, New York.
"Impact of Technological and Ecological Changes on Social Relations and Human Values in the Vendee Region of France." A study of the effects of mechanization, alterations in land use, and the growth of light industry upon values, attitudes, and cultural identity.

Robert J. Pranger. American Enterprise Institute, Washington, D.C.
For the support of 8 to 12 new resident scholars and fellows at the American Enterprise Institute, an organization which sponsors research on public policy issues and alternatives.

Jurg K. Siegenthaler, The American University, Washington, D.C.
"Industry, Society and the Environment"
To study the relationship between industry-induced environmental transformations and society in the Scranton, Pennsylvania region between 1850-1950.

Frederic J. Fleron, State University of New York, Buffalo, New York.
"Theories of Scientific and Technological Revolution in the U.S.S.R. and Eastern Europe." Analysis of theories which are playing an important role in shaping domestic, political, social and cultural developments, as well as foreign policy, in these countries.

Richard H. Vietor, University of Missouri, Columbia, Missouri.
"American Energy Policy Since 1945"
This study will be set in the context of changing relationships between the public and private sectors that result, in part, from the differing value systems of the groups involved.

Institute of Society, Ethics and the Life Sciences, Hastings-on-Hudson, New York. Challenge Grant for Institutional Development.
Grant to support four post-doctoral fellows.

## II. NEWS FROM THE SOCIETIES

### A. Society for the Study of Philosophy & Technology

The Society is sponsoring the following symposia:

1. A program on philosophy and technology to be held in conjunction with the Pacific Regional Meeting of the American Philosophical Association, March 23-25, 1978, San Francisco, California. The program, "Some Recent Developments in the Philosophy of Technology," will be on Thursday, March 23, at 10:00 a.m. Panelists will be Michael Scriven (University of California, Berkeley) and Robert McGinn (Stanford University).

2. A program to be held in conjunction with the Western Regional Meeting of the American Philosophical Association at the Netherlands Hilton Hotel, Cincinnati, Ohio, April 27-29, 1978. The program, being developed by Edmund Byrne (Department of Philosophy, Indiana University - Purdue University at Indianapolis), is entitled "Technology and Paolo Saleri's Archology." Tentative panelists are Saleri and philosophers Philip Fandozzi (University of Montana); Joseph Margolis (Temple University); Henryk Skolimowski (University of Michigan); and Willis Truitt (University of South Florida).

3. Efforts are underway to develop a philosophy and technology session for the Biennial Meeting of the Philosophy of Science Association, October 26-29, 1978, at the Jack Tar Hotel in San Francisco. The P&T program is being coordinated by Alex Michalos (University of Geulph, Ontario). Contributed papers are invited, and should be sent, by March 1, 1978, to: Peter Asquith, c/o PSA, Department of Philosophy, Michigan State University, East Lansing, Michigan 48824.

### B. Philosophy of Science Association

#### 1. Sixth Biennial Meeting

The Philosophy of Science Association will hold its Sixth Biennial Meeting at the Jack Tar Hotel, San Francisco, on October 26-29, 1978. The program will include symposia and invited papers as well as sessions devoted to the presentation of contributed papers.

Suggestions for symposia topics and the submission of contributed papers are invited. Maximum length for contributed papers is 3500 words and the closing date for submission is March 1, 1978. Suggestions and requests for information should be sent to the Chairperson of the Program Committee: Professor Ian Hacking, Department of Philosophy, Stanford University, Stanford, California 94305.

The Association itself will publish the proceedings of the meeting. Contributed papers will be printed in advance of the meeting as the first volume of PSA 1978. The symposia will be printed later as the second volume. This is the same procedure that the Association followed in

publishing PSA 1976, the proceedings of its 1976 meeting. In taking over the publication of its own proceedings the Association has been able to achieve timely dissemination of the papers at an affordable price. The two volumes of PSA 1976 (a total of 930 text pages) are published as one cloth-covered book, for $18.25.

2. PSA Research Problems Conference

A conference on the current status of research efforts in philosophy of science was sponsored by PSA on October 27-30 at Reston, Virginia with support from the History and Philosophy of Science Program of the National Science Foundation. The conference was a relatively small working conference with papers discussing the status of current work in philosophy of science from a variety of methodological perspectives and the relationship of work in philosophy of science to history of science, social studies of science, science education, and philosophy of technology.

The conference also included discussions with government agency officials about the possible utilization of research efforts of philosophers of science by various mission-oriented government agencies.

Papers from the conference will be edited by the conference organizers, Henry Kyburg, University of Rochester, and Peter D. Asquith, Michigan State University, and published by PSA during the summer of 1978. A report on recommendations arising as a result of the conference will also be forthcoming.

3. Teaching Philosophy of Science

Volume 2, No. 2 of Teaching Philosophy, now scheduled to appear in the late spring of 1978, will be devoted to articles on teaching philosophy of science. Included will be a collection of papers from a session (held at the 1976 biennial meeting of PSA) which dealt with how philosophy of science can best be taught in a diverse variety of insitutional settings. There are also additional papers on teaching philosophy of science to anthropology students, on philosophy of science team taught with an historian and scientist, on teaching philosophy of biology, as well as a survey of teaching methods in philosophy of science and a review of some recent classroom materials for teaching philosophy of social science. Copies may be purchased from Teaching Philosophy, 1207 Elm Street, Cincinnati, Ohio 45210.

4. 16th World Congress of Philosophy

The 16th World Congress of Philosophy will take place in Dusseldorf - Federal Republic of West Germany - from August 27 to September 2, 1978. The general subject of the congress "Philosophy and the World-Views of Modern Science" will be divided into eight special subjects:

I The Idea of the Universe
II Modern Biology and its Challenge to Philosophy
III Consciousness, the Brain and the External World
IV Scientific and Other Types of Rationality
V The Problem of Scientific Justification of Norms
VI The Mastering of Scientific and Technological Progress
VII The Successes and Limitations of Mathematization
VIII Controversies about Universals Today

An application form to participate can be obtained from: Secretariat of the 16th World Congress of Philosophy, Dusseldorfer Messengesellschaft m.b.H. NOWEA, Postfach 320203, D-4000 Dusseldorf 30, Federal Republic of Germany.

5. Sixth International Congress of Logic, Methodology and Philosophy of Science

The Sixth International Congress of Logic, Methodology and Philosophy of Science will be held in Hannover, Federal Republic of Germany, August 22-29, 1979, under the auspices of the International Union of History and Philosophy of Science (Division of Logic, Methodology and Philosophy of Science) and sponsored by the German Research Council (DFG) and the Land Niedersachsen. The congress will include the following 14 sections: (1) Proof theory and foundations of mathematics; (2) Model theory and its applications; (3) Recursion theory and theory of computation; (4) Axiomatic set theory; (5) Philosophy of logic; (6) General methodology of science; (7) Foundations of probability and induction; (8) Foundations and philosophy of the physical sciences; (9) Foundations and philosophy of biology; (10) Foundations and philosophy of psychology; (11) Foundations and philosophy of the social sciences; (12) Foundations and philosophy of linguistics; (13) History of LMPS; and (14) Fundamental principles of the ethics of science. The congress technical sessions will consist of a number of invited addresses and symposia, in addition to brief contributed papers.

The first circular with information about registration fee, accomodations and deadline for the receipt of abstracts will be mailed by the beginning of 1978. It can be obtained from: Sekretariat des Internationalen Kongresses fur Logik, Methodologie und Philosophie der Wissenschaften, Welfengarten 1, D-3000 Hannover, BRD.

C. History of Science Society

1. The California Institute of Technology Archives announces that the microfilm edition of the Robert Andrews Millikan Collection at the California Institute of Technology is now available for purchase as a complete set (81 rolls) or in single reels. Complimentary copies of the accompanying 98-page Guide are also available.

The Caltech Archives have recently prepared a Brief Guide to the California Institute of Technology Archives, which scholars may request.

Teachers and researchers are invited to make use of the extensive collection of pictorial materials. The archives will prepare slides or prints of its photographs, lithographs, and engravings at a nominal cost. For additional information, please write Institute Archives, Millikan Library 1-32, California Institute of Technology, Pasadena, California 91125.

2. An international symposium on the work of Christiaan Huygens, and its contemporary context, will be held in Amsterdam, The Netherlands, from 22 to 25 August 1979, to mark the 350th anniversary of Huygen's birth. In addition to papers by invited speakers, there will also be an opportunity for contributed papers to be delivered. A First Circular with a preliminary outline of the program of the Symposium can be obtained from the Secretary of the Organizing Committee: Dr. H.J.M. Bos, Committee Huygens 1629-1979, Mathematical Institute, Budapestlaan 6, Utrecht, The Netherlands.

3. The Society for the History of Alchemy and Chemistry has established the Partington Prize for an original and unpublished essay on any aspect of the history of alchemy or chemistry. Named for James Riddick Partington, the Society's first chairman, the prize consists of one hundred pounds (L100.00). The competition is open to anyone with a scholarly interest in the history of alchemy or chemistry who shall not have reached 30 years of age by the closing date, December 31, 1978. Additional information is available from the Secretary of the Society, Dr. G.K. Roberts, Faculty of Arts, The Open University, Milton Keynes, MK7 6AA, England.

4. The Archives of the History of American Psychology will award a Research Fellowship of up to $500 to a scholar wishing to utilize the resources of the Archives. The deadline for applications is March 1, 1978. Details are available from John V. Miller, Jr., Director of Archival Services, University of Akron, Akron, Ohio 44325.

5. The American Society for Eighteenth-Century Studies (ASECS) announces the second annual Louis Gottschalk Prize for an outstanding historical or critical study on a subject of eighteenth-century interest. The following criteria for eligibility have been established:

a) A book submitted for this year's competition must have been published in 1977.
b) The author must be a North American scholar, either a citizen of the United States or Canada or a permanent resident thereof.
c) The book must be submitted not later than 15 March 1978.
d) Submission must be made by the publisher, not the author.
e) All scholarly books, including commentaries, critical studies, biographies, and critical editions, written in any modern language, are eligible. Books which are primarily translations are not eligible. The author must be a member of the ASECS in good standing at the time the award is made.

The first annual Gottschalk Prize, 1976, was awarded to Margaret C. Jacob for her book, The Newtonians and the English Revolution, 1689-1720 (Cornell University Press, 1976). For additional details about the competition, write to: Professor Paul J. Korshin, American Society for Eighteenth-Century Studies, Department of English D1, University of Pennsylvania, Philadelphia, Pennsylvania 19104.

## III. MEETINGS CALENDAR

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| 12-17 February 1978 | American Association for the Advancement of Science, 1978 Annual Meeting; Sheraton-Park Hotel, Washington, D.C. |
| 21-23 February 1978 | Association for Computing Machinery, 1978 ACM Computer Science Conference; Detroit, Michigan. |
| 22-25 February 1978 | The Society for Philosophy of Religion; Mills Hyatt House, Charleston, South Carolina. |
| 2-4 March 1978 | Seventh Symposium on Philosophy and Medicine, "Moral Use of New Knowledge in the Biomedical Sciences"; University of Missouri at Columbia. |
| 23-25 March 1978 | American Philosophical Association, Pacific Division Meeting, Jack Tar Hotel, San Francisco, California. |
| 23-25 March 1978 | American Society for Value Inquiry [held in conjunction with APA Pacific Meeting]; Jack Tar Hotel, San Francisco, California. |
| 23-25 March 1978 | Society for Philosophy and Public Affairs [held in conjunction with APA Pacific Meeting]; Jack Tar Hotel, San Francisco, California. |
| 27-30 March 1978 | American Physical Society, 1978 General Meeting; Washington, D.C. |
| 12-15 April 1978 | Organization of American Historians, General Meeting, with sessions on "Beyond Technological Determinism" (April 14), "Organizing and Delivering Health Care in America: 1865-1920" (April 15), and "Scientific Knowledge and Public Policy" (April 13); Statler Hilton, New York City. |
| 21-22 April 1978 | Twelfth Conference on Value Inquiry, "Human Values and Economic Activity." Contact: Conference Directors, SUNY College of Arts and Sciences, Genesco, New York, 14454. |
| 27-29 April 1978 | American Philosophical Association, Western Division Meeting; Netherland Hilton Hotel, Cincinnati, Ohio. |
| 27-29 April 1978 | Society for Philosophy and Public Affairs [held in conjunction with APA, Western Meeting]; Symposium: "Morality and Nationality: The Ethical Significance of Political Boundaries"; Netherland Hilton Hotel, Cincinnati, Ohio. |
| 27-29 April 1978 | American Society for Value Inquiry [held in conjunction with APA Western Meeting]; themes: Potentiality and Human Values; 'Caveat Emptor' and Corporate Responsibility; Netherland Hilton Hotel, Cincinnati, Ohio. |

IV. RECOMBINANT DNA

A. Literature Guide: Review of Recent Books on the rDNA Controversy

by Rae Goodell
Massachusetts Institute of Technology

The Ultimate Experiment: Man-Made Evolution, by Nicholas Wade. New York: Walker, 1977.
Biohazard, by Michael Rogers. New York: Alfred A. Knopf, 1977.
Playing God: Genetic Engineering and the Manipulation of Life, by June Goodfield. New York: Random House, 1977.

Press coverage of the recombinant DNA issue has been intensive since 1974, when reporters reacted with excitement to the announcement that scientists were calling a temporary moratorium on certain genetic experiments. As concern and contention spread, media "spot" coverage was supplemented by somewhat more reflective magazine articles, in publications as diverse as Atlantic and TV Guide, Time and Mother Jones. Given the sheer durability of the issue, it was inevitable that there would be a third media phase: books.[1]

Nicholas Wade's book, The Ultimate Experiment: Man-Made Evolution, is based on his coverage of the recombinant DNA issue for Science magazine's "News and Comment" section. Having produced over twenty DNA articles for Science in the last four years, Wade has become the science community's DNA scribe, and copies of his stories have been a common sight on the desks of Cambridge city councillors, Kennedy staff members, National Institutes of Health administrators, and newspaper reporters. The Science articles, clipped and compiled, made an excellent introduction to the controversy. Without creating a patchwork effect, Wade has revised this Science material and supplemented it with notes and observations that had not been appropriate in the spartan "News and Comment" format. The Ultimate Experiment is thus a DNA primer, an accurate, economical, chronological account of the basics. Wade communicates both the electrifying enthusiasm and the uneasy foreboding that permeated science and government when a sudden surge of research discoveries produced recombinant DNA technology. "The technique," Wade explains, "is in essence a method of chemically cutting and splicing DNA, the molecular material which the genes of living organisms are made of. It enables biologists to transfer genes from one species to another, and in doing so to create new forms of life." With the ability "to write in

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*Professor Goodell's original review, "The Alchemical Man," appeared 11 September 1977 in The Washington Post. This edited and revised version appears with the permission of The Washington Post.

the genetic language as well as to read it," Wade predicts that scientists will be able to harness the biological world as they have harnessed the physical world, and ultimately to control evolution.

Wade compares the significance of the development to the domestication of plants and animals, which transformed the Neolithic people from hunters to farmers. Without hawking science's wares, he makes reasonable predictions for, first, the accumulation of basic knowledge, later the understanding of cancer, even later the curing of genetic diseases like sickle-cell anemia. On the negative side, he points out that, while debate has centered on the possibility of novel diseases caused by laboratory accidents, there are other causes for concern, such as use of the technique for biological warfare by superpowers or terrorist groups.

After a briefing on the scientific developments, The Ultimate Experiment methodically traces the highlights of the controversy through science's administrative channels, the moratorium, the Asilomar conference and the National Institutes of Health safety guidelines. Written in February and March 1977, the book focuses on events in the American scientific community, touching on the spread of the debate to city and state governments, but only briefly on the international response.

Wade is one of a handful of professional science reporters in this country who can be counted upon to be clear in their coverage and dependable in their facts. This professionalism can, however, be a disadvantage in drawing conclusions. It is an occupational hazard of seasoned science writers to contract the infectious enthusiasm of scientists, an optimism that numbs concern about the implications of research and development. Thus Wade underlines the pro's in the pro's and con's:

> Whatever the merits of the argument, and they are hotly disputed, it would seem in a purely general way that in shuffling genes from one organism to another, scientists are playing evolution's game without exactly knowing either the rules or what the forfeit may be for transgressing them. But many biologists believe, and they may well be right, that evolution's rule is that anything goes and that thus there is nothing to be worried about.[2]

Ironically, in passages like this, it is often doubt that lingers.

On the whole, of course, the book is not intended for those who have been following the debate closely, although the very starkness of Wade's arguments will have an impact on even the most jaded veteran of DNA politics. The Ultimate Experiment is a lucid introduction for beginners, who are vastly more numerous and more needy that our continually recycled experts.

If Wade's book is a superhighway through the intricacies of the DNA debate, Michael Roger's Biohazard is the scenic route. Taking a sharp turn off the beaten path of science writing, Rogers combines a knack for creative writing with an interest in the more spectacular and profound contemporary science developments.

As an associate editor for Rolling Stone magazine, Rogers had a hard time gaining acceptance among DNA scientists. At the time he applied for an invitation to the landmark Asilomar conference, the limited press spaces were being parcelled out to reporters from such publications as the New York Times, The Washington Post, and Science. Rogers got the nod only after he won the 1974 AAAS-Westinghouse Science Writing Award, presented just a month before Asilomar began. When his honest and clever article, "The Pandora's Box Congress," appeared in Rolling Stone four months later, however, scientists and scholars praised his journalistic tour de force, and Rogers settled down to produce a book.

Biohazard is one-fourth Asilomar in content, and all "Pandora's Box" in style, a vivid and perceptive narrative of the scientists' role in researching and regulating recombinant DNA. Joking about his own naiveté and ignorance when he first attended Asilomar, Rogers coaxes the reader along with him through the sensations of a high containment laboratory, a safety workshop for laboratory workers, guideline drafting sessions, technical bull sessions, and genetic experiments at Cold Spring Harbor Laboratory.

In Biohazard, science becomes humorous and scientists human, portrayed with the freshness of Norman Mailer's Of a Fire on the Moon, but without the oppressive egotism. In his chapters outlining the history of DNA research, Rogers tweaks popular misconceptions about scientific method and the march of progress, describing long periods of dormant ideas, dead ends, delays. Fresh from those misconceptions himself, he compares them to his own widening experiences:

> At conferences, speakers point confidently to portions of that map [of the E. coli bacteria chromosome] and speak blithely of deleting a gene here, adding a gene there. And after a time, the business of recombinant DNA begins to seem as easy as the way one newspaper article characterized it: a matter of chemical scissors, needles and thread. What is easy to forget in the midst of this familiarity is that these manipulations are performed on an almost unimaginably small scale. Several million E. coli will dance on the head of a pin...
>
> And so molecular genetics may well soon replace the romantic image of the biologist glued to his microscope with one showing a white-coated figure staring at bands on agarose gels or gazing fixedly at the readout of a scintillation counter.[3]

In spite of his consciously "lay" point of view, Rogers is generally accurate, although occasionally confusing bacteriophages (viruses that infect bacteria) and plasmids (tiny rings of bacterial DNA), or blurring the memberships of scientific committees. Like Wade, he chooses to limit his perspective, concentrating on the American scientific community at the expense of international developments and political ramifications. Like the Rolling Stone article two years ago, however, Biohazard reveals nothing which should threaten scientists. Rogers describes only the public meetings and workplaces where scientists have learned to expect the press. The scientific community has little to lose from his tales except perhaps a little false dignity, a characteristic that has long hampered relations between science and the public. Rogers' objective, admirably

achieved, is better public understanding of science.

After a superhighway and a scenic tour, we come to a complicated rotary intersection, a book spinning with ideas. June Goodfield's Playing God identifies many of the uncomfortable and confusing questions raised by recombinant DNA, and refuses to offer facile answers. It is tempting to label the book, as a taxi driver once labelled Boston's rotaries, "not for amateurs." Yet the book is important precisely because of it tentativeness. Complexity and intensity are not edited out for the sake of style; humility, honesty and humanity have high priority. The last chapter, it is made clear, is not a conclusion; the problems are ongoing. Is the technology important? Are the hazards imaginary? Is society capable of stopping the research if it wants to? What are the likely consequences of public involvement in science decisions? What kind of reverberations could be expected throughout modern industrial society if we tamper with the existing scientific system? Who is affected adversely if the research is slowed down? What are the likely applications of recombinant DNA research? Can society handle these developments if we let them arrive?

Goodfield's thesis is that the recombinant DNA dispute accelerated changes already impending in the relationship between science and society:

> ...the current state between science and society is like that of a supersaturated solution. A crystal of contention, recombinant DNA, has been dropped into the solution, and then as happens in a supersaturated solution, crystallization has occurred, and a whole conglomeration of issues, concerns, arguments, and debates have rapidly appeared.[4]

The old Rousseauian social contract between the professional scientific community and the larger society is dissolving and a new contract is evolving, with inevitable wrenching changes in beliefs and assumptions in the process. For Goodfield, then, recombinant DNA is a case study in a larger history of science in society. Her exposition of the DNA case itself is useful - she relates, for example, her experiences carrying out a DNA experiment as a guest at a Michigan State University laboratory. And the basics are accurate enough - although, as in Biohazard there are a few jarring errors in scientific explanations (bacteriophages, etc.) and historical facts (dates, membership of committees, etc.).

Goodfield's strength is in putting events in perspective. She places recombinant DNA technology, for example, squarely amid a cluster of developments headed toward human genetic engineering. In a chapter valuable for lay readers, she traces some of the historical roots of the science community's Amish-like isolation, its curious lack of external accountability. Science is a newcomer to the professions, she reminds us; and 19th century efforts to dignify the profession were often met with ridicule. (Members of the British Association for the Advancement of Science "were sitting ducks for parody.")[5] Withdrawn and wounded, scientists responded to German romantic attitudes toward learning, fastening on the model of science as a search for truth, requiring freedom from politics and practicality.

Goodfield goes on to suggest, however, that when recombinant DNA arose, somehow the scientists discarded their traditional values and assumptions, viewing

DNA as a "public issue." On the contrary, the process was much more painful, precisely because scientists were making traditional assumptions. A group of well-intended and conscientious scientists undertook to control DNA risks publicly, but internally, using the customary channels of self-regulation: communication with colleagues via professional journals, study committees within the National Academy of Sciences and the National Institutes of Health, conferences of scientific experts. Because it was applied inappropriately to a public health matter, the scientists' system failed. Politicians and the press pulled the debate away from scientific channels, and confronted scientists with their own very different set of assumptions about the handling of health safety: the necessity for participation from the population at risk, advice from a variety of experts, governmental enforcement, monitoring.

Now the public, with equally good intentions, could easily make the opposite mistake: it could inappropriately apply standard governmental regulatory mechanisms to the scientific enterprise. Perhaps these books, by reminding us of past misjudgments, will help fend off future ones. Otherwise, we can expect future DNA history to chronicle our failures. At least six more books are already in progress, including the proceedings of the National Academy of Sciences forum in March 1977[6], a collection of essays from University of Michigan Press - and a novel by Arthur Herzog. Herzog, author of The Swarm, Heat, and other novels says his new work will describe how a responsible man could inadvertantly cause a disaster using DNA technology.

Michael Rogers has predicted a movie about the recombinant DNA issue, and it turns out he is right: N.I.H. scientists say they were consulted several months ago by a New York film company, and that Stirling Silliphant, whose screenplay for "In the Heat of the Night" won an Academy Award, is at work on that script. Silliphant has the unlikely task of pulling together a plot from the chaos, of creating orderly drama based on fact. As Rogers says, "All one can hope in addition is that it won't also be necessary to invent a happy ending."

NOTES

1. The race to produce a book on the DNA issue was won last June by Robert Cooke, science editor for The Boston Globe, when he published Improving on Nature: The Brave New World of Genetic Engineering.

2. Nicholas Wade, The Ultimate Experiment (1977), p. 5.

3. Michael Rogers, Biohazard (1977), pp. 130 and 135.

4. June Goodfield, Playing God (1977), p. 72.

5. See also J. Goodfield, "Humanity in Science: A Perspective and a Plea," Science 198, 11 November 1977: 580-585.

6. National Academy of Sciences, Research with Recombinant DNA (Washington, D.C.: National Academy of Sciences, 1977).

## B. The U.S. Senate and Recombinant DNA Research

by Aaron Seidman*

The debate over regulation of recombinant DNA research continues in Washington. Earlier this year a bill to regulate the research emerged from the Subcommittee on Health and Scientific Research of the Senate Committee on Human Resources, but ran into trouble before reaching the floor. The bill (S.1217) was originally submitted by Senator Edward Kennedy (D-Massachusetts), Chairman of the Subcommittee, on behalf of the administration, but was modified considerably before being reported out. Senator Gaylord Nelson (D-Wisconsin) offered a substitute bill, in the form of an amendment to S.1217, but before the bill came up for debate, Senator Kennedy withdrew support for the Subcommittee version. The net effect was to kill DNA regulatory legislation for the rest of the current session of Congress. (A House bill, H.R.7897, drafted by the Subcommittee on Health and Environment of the House Interstate and Foreign Commerce Committee, was bogged down in the full Committee).

Against this background, the Science, Technology, and Space Subcommittee of the Senate Committee on Commerce, Science, and Transportation conducted hearings on 2, 8, and 10 November 1977. The purpose, according to Subcommittee chairman Adlai E. Stevenson (D-Illinois), was to provide a basis for legislation acceptable to most parties involved in DNA research and its oversight:

> These hearings will attempt to cast some needed light on two questions that have been at the heart of the recombinant DNA controversy: first, how can we reap the benefits of recombinant DNA research while protecting humanity against some biological catastrophe? second, how can we protect researchers, the public at large, and the environment from hazard while respecting the scientist's freedom to conduct research in a responsible manner? To what degree can this protection be accomplished by self-regulation and to what degree must we rely on public authority?

For Harrison Schmitt (R-New Mexico) the hearing also provided an opportunity for discussion of his bill (S.2267) to establish a National Science Policy Commission.

The 27 witnesses ranged from the President of the National Academy of Sciences to a Harvard graduate student, from scientists actively engaged in rDNA research to a philosopher of ethics. There were Directors of N.I.H. and the Office of Science and Technology, lawyers, representatives of the pharmaceutical

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*Mr. Seidman recorded the recent hearings of the Senate Subcommittee on Science, Technology, and Space in his role as consultant to the Recombinant DNA History Project of the Massachusetts Institute of Technology Oral History Program. The Project (described on pp. 2-3 in this issue) is supported by the National Science Foundation and the National Endowment for the Humanities.

industry, and public interest and environmental spokespersons.

The first day was devoted to a discussion of the status of rDNA research and to issues of scientific freedom and responsibility. Hearings on the second day focused on the administration's position on regulation of rDNA research and its handling of a specific case in which there was a violation of the N.I.H. guidelines. As part of this process the Subcommittee questioned the scientists responsible for the laboratory where the violation occurred. On the last day there were three panels, each representing a major interest group: microbiologists, public interest and environmental organizations, and the pharmaceutical industry.

The central issue underlying all the testimony was the risk of conducting research with recombinant DNA techniques, one side arguing that the dangers were so small that regulation should be held to a minimum, and the other insisting the hazards were as yet unknown - should they turn out to be serious, the consequences might be irreversible.

The scientists active in rDNA research generally questioned the need for any legislation, preferring to be bound only by guidelines established by N.I.H. They conceded that it might be necessary to provide N.I.H. with legislative extension of its authority, to bring non-federally funded research under the same guidelines, although some questioned the desirability of uniform guidelines for all. For many of these witnesses, the key issue in the debate over regulation was one of scientific freedom.

Other witnesses argued that the evaluation of the risks on which the guidelines were based had been conducted by experts in production of recombinant DNA, not by experts in epidemiology and environmental impact (a point disputed by the N.I.H. and others). The principal issue, according to this view, is occupational safety and public health (and only in that sense has it anything to do with freedom of inquiry). Lawyers who testified favored a conservative approach, suggesting the prudent course would be to avoid taking chances with safety.

The administration, represented by Frank Press (Director, Office of Science and Technology) and Donald S. Frederickson (Director of N.I.H.) supported the idea of regulatory legislation. Press said the administration supported original legislative proposals (S.1271) "as of now," but refused to commit himself on future positions. Frederickson was more specific, objecting to the version of the bill that had emerged from committee (S.1271), especially to its provision for an autonomous regulatory commission that would be independent of HEW. He did favor legislation that would provide uniform standards for all rDNA research, federally funded or not. Although opposed to a separate regulatory agency, Frederickson thought enforcement of regulations was best done by an agency other than N.I.H.; he suggested the Center for Disease Control, which, like N.I.H., is part of the Public Health Service.

Former AAAS President Margaret Mead also testified at the hearings. Contending that opposition to legislation was unjustified, she maintained that there was no need to be in such great haste to exploit the new technology; safety precautions should be fully observed. According to Mead, the government itself should conduct critical P4-level experiments to provide better data for

risk assessment, with all other P4 experimentation forbidden until that data is available.

Representatives of the pharmaceutical industry emphasized their voluntary adherence to the N.I.H. guidelines, but strongly favored national legislation that would obviate the demand for local regulation even if there were no federal preemption clause. They made it clear, however, that they would oppose disclosure provisions that might threaten patent rights or trade secrets.

As Chairman Stevenson pointed out, to develop legislation that will pass in 1978,

> ...will require a serious attempt to find a solution which parties to the dispute can support. We are not likely to arrive at a satisfactory answer through myriad floor amendments or by horse-trading in conference with the House. The issue is too delicate; the subject matter too intricate; and the stakes are too high.

A full transcript of the hearings will be published by the Committee on Commerce, Science, and Transportation in early 1978.

C. "Science and the Public Interest: Recombinant DNA Research"

Notes on a Conference at Bloomington, Indiana, 10-12 November 1977

Based on observations by Shirley Cordes
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In August 1976, in response to published reports on recombinant DNA research and to plans by Indiana University to construct a P-3 level laboratory facility on its Bloomington campus, Mayor Francis X. McCloskey asked the city Environmental Quality and Conservation Commission to determine whether research would constitute a threat to the health and environment of the community. The Commission consequently sponsored a public forum in November 1976, at which university representatives explained the research and responded to audience questions. Following this forum, representatives of several groups appeared before the Commission and expressed dissatisfaction with what they considered to have been a one-sided defense of the research. Therefore, with the cooperative sponsorship of the Poynter Center on American Institutions and a grant from the National Endowment for the Humanities, the city of Bloomington held a second, larger conference in November 1977 to consider "the societal, ethical, legal and public policy implications of basic research and technological problem-solving using recombinant DNA."*

Remarks at the formal opening underlined several themes that reappeared throughout the conference: 1) the need for better communication on this issue between the scientists and the public; 2) the need for resolution of public doubts and fears - a point emphasized by the mayor; and 3) the problem of discussion by non-biologists of highly complicated, highly technical research - what William Lee Miller, Director of the Poynter Center, called "research done by a very few, understood by a few, which will affect millions."

The difficulty of communication was most evident in the first session - attended by over 500 people - at which papers by biologists prompted heated exchanges and attacks on the scientists' reassurances of safety. Liebe Cavalieri (Cornell Graduate School of Medicine) argued for a thorough evaluation of the recombinant technique prior to its incorporation into industrial technology, stating that freedom of technology rather than freedom of inquiry is the issue. Noting that the public has often been helpless to prevent the development of apparently beneficial technologies which later turned out to be burdens, Cavalieri suggested that "technological fixes" be weighed against other problem solutions, such as removal of the causes. The speech on "Recombinant DNA: Issues and Consequences" by Frank Putnam (Indiana University Dept. of Microbiology) was an impassioned defense of biologists engaged in recombinant DNA research and of

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*See Newsletter #21, October 1977, pp. 1-2, for list of papers and participants.

research scientists in general, coupled with assurances that the DNA research is no more risky than many other experimental procedures. Putnam articulated the fears of many scientists: that excessive regulations would cripple DNA research, that controls will be applied by ignorant bureaucrats, and that regulation of this research could lead to regulation of all biomedical research. During the subsequent discussion period these concerns were reiterated by one scientist, who asserted that the NIH guidelines have impeded experiments to assess risks of recombinant DNA research.

The session on constitutionality, liability and insurability questions concerning hazardous research narrowed the focus to practical matters facing governments and research institutions. In an examination of governmental power to regulate recombinant DNA research, Patrick Baude (Indiana University Law School) pointed out that freedom of inquiry is not among those freedoms specifically protected by the First Amendment, and noted that even the protected freedoms may be restricted under certain conditions. Baude delineated federal, state, and local powers to regulate in this area: Congress could enact laws which would preempt local regulatory powers and prevent state and local governments from interfering with the research; then, too, state governments could enact their own legislation. Baude also noted that the power of local governments to regulate a resident state university has thus far been limited to informal agreements.

Roger Dworkin (Indiana University Law School), speaking on the applicability of present and planned legal institutions, pointed out that existing laws cannot deal effectively with the fears that are the impetus for regulation. Although workmen's compensation and the law of torts do cover individual accidents, there is no existing mechanism for mass torts, such as those envisioned in the case of an rDNA "accident." In Dworkin's view the NIH guidelines were prepared too late and could not prevent future unwanted applications; he (like many others) expressed concern that the guidelines apply neither to industry nor beyond the boundaries of the United States. Questions of accidents or torts led to discussion of the insurability of recombinant DNA research, both for the institutions and the individual researchers. William R. Miller (American States Insurance Company) cited precedents, such as the insurance pools set up by several insurance companies to insure large liabilities like nuclear reactors, and discussed reasons for their reluctance to insure certain other risks, such as the swine flu immunization program. Miller outlined the conditions under which rDNA research could be an insurable risk. Although some aspects of liability would be included under present coverage of the research institution, general insurability would require additional precautions: e.g., earthquake and fire resistant facilities, limited controlled access, independent ventilation, securely constructed floor and wall joints, and adequate disposal of laboratory waste.

Afternoon sessions returned to the debates over who should set policy and how to reconcile the several interests involved. Burke Zimmerman (Staff member, House Subcommittee on Health and the Environment) in "The Right of Free Inquiry: Should the Government Impose Limits?" dismissed the claims of some scientists that the proposed federal legislation would limit the right of free inquiry. Citing existing limits on research which are tolerated by scientists - such as the need to obtain grant funds, the licensing of radioactive isotopes, and radiation safety regulations - Zimmerman expressed the belief that the legislation

as written would not further restrict scientific freedom. Sheldon Krimsky (Tufts University), a member of the Cambridge Experimentation Review Board, focused on the philosophical and political roots of the current conflict, contending that political considerations influenced both the preparation of NIH guidelines and the composition of the Asilomar conference group. He maintained that in their definition of the problem, rationalization of dissident views, choice of bacterial host, and analysis of risk, scientists made the choices which would permit them to get on with the research as soon as possible.

In the Friday night presentations on "Corporate and Citizen Viewpoints," Roland Beers (Miles Laboratories) analysed the industrial application of the recombinant DNA technique. To the industrial researcher, the recombinant DNA technique is nothing more than a transfer of genetic material, since there are other existing methods to produce new organisms (e.g., selection of natural mutants, use of mutagens to produce artificial mutants). Beers suggested that the potential of the rDNA technique for producing new organisms has been exaggerated and concluded with a frank plea for respect for the economic motive.

The last discussion of the day was dominated by the "public doubts and fears" theme that had earlier been raised by Mayor McCloskey. When moderator Daniel Metlay asked the panelists what it would take to convert them to the opposite point of view, most of them answered "an appropriate change in the risk data." This exchange roused audience interest in the risk calculations and provoked a number of questions on this point. The resulting discussions illustrated how both sides of the controversy use the largely theoretical risk calculations to support their respective positions: proponents can assume them to be small; opponents, large.

## The Social and Ethical Implications of Recombinant DNA Research

During the final Saturday session, William May (Indiana University, Department of Religious Studies) traced the history of the scientist's right to know and its conflict with the classical theological position on the sin of "unbridled curiousity." Drawing on Aquinas' distinction between the "right to know" and "the right to create," May took the position that the particular difficulty of rDNA research is that creation is inherent in the search for knowledge. Although opponents would like to see the research limited to the narrower "right to know," the fact that the process entails creation means that such limits are impossible. Regulation thus becomes a question of controlling the manner in which the "right to create" is exercised, in order to protect the safety and welfare of the public. In May's view, the NIH guidelines may be regarded as a license to create under safe conditions. As Roger Dworkin had pointed out earlier in the conference, there is no question of completely banning the recombinant DNA technique, which is simple and has been widely published. The central question seems to be whether it would be feasible to restrict the use of the technique for undesired applications while permitting its use in basic research.

Some Comments on Public Participation in the Forum

Public access to conference discussions was both easy and informal: brief statements as well as questions were accepted from the audience, and the format permitted lengthy interaction among panelists, as well as between panelists and the audience. However, although the quality of the discussions was often good, it was apparent that most of the audience questions were coming from those who had been participating in the forum as speakers or panelists. The general audience seemed content to let these persons - and a few other scientists and journalists - serve as spokesmen.

Several factors may account for this response from non-scientists. First, the scientific content of the debate is highly technical; it involves many terms and concepts unfamiliar to the person with even a general education in science. Second, the recombinant DNA debate has been defined by many participants as a discussion of the limits of freedom of inquiry, thereby shifting the focus of discussion away from the environmental effects of applications, a topic that might be expected to attract more attention and interest by non-scientists. It was stated repeatedly during the forum that scientifically knowledgeable policy-makers must be trained so that our society can deal more effectively with this and similar issues. There were noticeably fewer suggestions about how the public can be usefully involved.

# V. PROFESSIONAL ETHICS

## A. Professional Freedom and Responsibility: The Role of the Professional Society*

By Frank von Hippel
Center for Environmental Studies
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Today the activities of professional societies relate primarily to the advancement of the technical skills and economic status of their members. Most of the societies do recognize, however, that their members have larger responsibilities beyond the purely technical efforts undertaken for employers, and such responsibilities are mentioned explicitly in the codes of ethics and employment guidelines of the organizations. Thus, for example, the Engineer's Code of the National Society of Professional Engineers states that the engineer "will use his knowledge and skill for the advancement of human welfare." The code also explicitly acknowledges the possibility that this duty may sometimes bring the engineer into conflict with demands of an employer and instructs him in such cases to "regard his duty to the public welfare as paramount."[1]

Do employers generally recognize this responsibility? The answer is a qualified "yes" for those scientists based at universities, which have a tradition of academic freedom. In industry and government, however, an increasing number of "whistle blowing" cases involving professionals provide evidence that the situation may often be quite different.

A 1972 survey of 1100 randomly-selected members of the National Society of Professional Engineers (NSPE) indicated that publicized whistle blowing cases may be only the visible representation of strongly-held feelings on this subject among engineers.[2] In this survey by James Olson, over 10 percent of the approximately 800 respondents answered "yes" in each case when they were asked if "they were required to do things which violated their sense of right and wrong or if they felt that their employers interfered with their personal rights." Over 40 percent felt "restrained from criticizing their employers' activities or products." Furthermore, most had at one time or another felt obliged to question - intramurally at least - some of the activities in which their organizations were involved. About 7 percent responded affirmatively in each case when they were asked whether they had sought a transfer within their organization or had resigned their jobs "when asked to work on a product or project they believed not to be in the public interest." Over 20 percent had refused to work on a project or on a client's commission or to accept a job offer for this reason; and 60 percent had "expressed their disapproval of a project to their employer or client."

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*Based on an invited address to the Annual Meeting of the American Association for the Advancement of Science, February 21, 1977.

Most of the respondents to Olson's survey were in favor of professional societies "taking actions to keep firms from penalizing employees active in serving the public interest," "public condemnation of firms which violated the public interest," "recommending engineers not to work for such firms," "finding new jobs for engineers fired because of socially responsive actions," and in favor of the "organization of engineers employed by a firm which makes unsafe products to stop it from doing so." Slightly under half even favored "having societies support public service engineering groups financially."

Five years later these proposals look radical when compared to what the professional societies are actually doing. For example, the National Society of Professional Engineers (which published Olson's article) has a Board of Ethical Review which offers guidance to the society's members through the monthly publication of case studies in its journal. These cases are hypothetical, however, involving "engineers A and B" and "companies X and Y" and almost all of them deal with issues relating to the ethics of competition among professional engineers in private practice, rather than with issues of social responsibility. When professional societies have been confronted with actual cases involving social responsibility, the societies have generally not become involved - and for perhaps obvious reasons. Currently, professional societies are not organized to undertake substantial interventions in the relationships between professionals and their employers. And, since the leaderships of professional societies ordinarily come either from the management levels of industry and government or from academia, they are often either unwilling to intervene in or are unfamiliar with employee-management controversies.

If the response to Olson's questionnaire accurately reflects the feeling of a large fraction of the scientific and engineering community, then a movement from within some of the professional societies to increase the ability of the societies to deal more effectively with such issues should find considerable political support. Indeed, the election of Alan C. Nixon to the Presidency of the American Chemical Society in 1973 represented a successful insurgency by ACS members who felt that the society should be more involved with issues of job security.

Currently, the most developed arrangements made by a professional society to protect the professional freedoms and responsibilities of its membership appear to be those of the American Association of University Professors, which has rather effectively used moral suasion with university administrators on questions of primarily academic freedom. The relationship between academics and their employers, however, tends to be more equal and therefore more susceptible to such persuasion than is the rule in other professions.

## Arrangements Outside the Professional Societies

Even if professional societies cannot themselves set up adequate mechanisms to protect the responsible dissent of their members, they might be willing to support other institutional arrangements for offering such protection. It is therefore of interest to review the current status of such institutions.

Arrangements exist for dealing with disputes over matters covered by labor contracts between organized labor and management. A rather highly developed system of mediation and arbitration using independent professional arbitrators[3] has evolved as an alternative to labor-management confrontations by strikes and lockouts. But such arbitration arrangements tend to deal with "bread and butter" issues and not issues of social responsibility, and do not cover most scientists and engineers.

For government employees, agency and civil service procedures offer grievance appeal mechanisms. Yet recent public disputes between management and employees at the Food and Drug Administration[4] and the Nuclear Regulatory Commission[5] have revealed important cases in which these mechanisms have not adequately protected employees who have raised issues of public health and safety. Indeed, it was the revelation of numerous agency retaliations against dissenting Federal employees, which led Senator Edward Kennedy to introduce legislation in 1975 to protect federal employees who on their own initiative provide information to the public which the public is entitled to request under the Freedom of Information Act.[6]

Legal Protections of Professional Responsibility

The United States has no general law such as Great Britain's Trade Union and Labor Relations Act, under which appeals of unfair dismissal can be taken to various industrial tribunals;[7] but particular provisions in U.S. law do give some protection to employees who bring specified classes of occupational or environmental hazards to official attention.[8] Thus, for example, the Occupational Safety and Health Act of 1970 contains the provision that:

> No person shall discharge or in any manner discriminate against any employee because such employee has filed any complaint or instituted or caused to be instituted any proceeding under or related to this Act or has testified or is about to testify in any such proceeding or because of the exercise by such employee on behalf of himself or others of any right afforded by this Act.

The section then goes on to describe enforcement of this protection. Briefly, an employee who feels that he has been discriminated against because he has aided enforcement of the Act may complain within 30 days to the Secretary of Labor; the Secretary must investigate the complaint and make a finding within 90 days. If the Secretary determines that an employer or other party has violated this section of the Act, he must bring an action in a U.S. district court. The Court may order "all appropriate relief including rehiring or reinstatement of the employee to his former position with back pay."

A recent report by Morton Corn, then an Assistant Secretary of Labor, on the implementation of this provision indicates that, as more workers become aware of the employee protection provision of the Occupational Safety and Health Act, the number of complaints have risen: about 700 in FY 1975 and 1600 in FY 1976.[9] Approximately 20 percent of all the complaints were determined by OSHA investigators to involve violations of the Act. Somewhat more than half of these

(or a few hundred) were settled out of court - typically by offers of reinstatement, back pay, and the posting of a notice to employees by the employer describing the discrimination action and its settlement. Corn cited the following two cases as evidence that employees need protection against retaliation:

1) In a small town in South Dakota, an employee anonymously filed a safety and health complaint which triggered an OSHA inspection of his place of work. In retaliation, the employer suspended all employees without pay until the complainant stepped forward. He was then fired and the rest of the employees were reinstated. Ultimately, as a result of OSHA's intervention, the employer offered the employee full reinstatement with back pay.

2) In New Mexico, a part-time school bus driver complained to his employer that some of the buses had deficient brakes. When his complaint was ignored, he contacted the State Department of Transportation and the State Police. The safety inspection which resulted was followed by his dismissal. After complaining to OSHA, he was given back pay (he didn't want his job back) and the employer posted a notice for its other employees describing the case.

In cases where a settlement was not negotiated and the case was taken to court, things did not work out so well for employees who took complaints of retaliation to OSHA. At the time of Corn's report (November 1976), about 60 cases had been taken to court: one had been won and eight lost, with the remainder pending. Because of the slowness of the legal system (and to some extent because of lack of enthusiasm within the Labor Department about prosecuting employers), it appeared that recourse to the courts had helped few people - except as a threat.

There are of course limitations to any kind of protection that can be offered to a dissenting employee in an organization. Legislation might protect his livelihood, if he is found to have acted responsibly, but, in the long run, if the management does not want him, he will probably find his position so frustrating that he will decide to leave of his own accord - as in the school bus driver case. This does not mean that mechanisms to provide employee protection are necessarily valueless, however. They can protect the employee from being rapidly "railroaded" out of his livelihood; they provide him with an impartial hearing; and if the examiners find he has acted responsibly, then he will have some protection against being "blackballed" in his search for another job.

## Dealing With the Issues

Thus far we have discussed only the protection of dissenters. Arrangements to deal with the substance of the dissent are, however, at least as important as the protection of the right of responsible dissent. For, even if dissent is protected, it will be pointless if it does not give rise to a competent outside review of the issues in dispute between the employee and his management and, if necessary, bring about outside intervention. Current institutional arrangements for holding organizations accountable in such cases are *ad hoc* and generally ineffective. If the dispute receives enough public attention, the organization involved may set up an "independent blue ribbon panel of experts" or request a review by an existing advisory panel. However, such a panel - because of its special relationship with the management of the organization - will usually

report its findings in such muted tones that the agency is neither seriously embarrassed nor forced to do anything as serious as reorganize its management personnel or basic approach - even if the panel finds that the employee has raised some valid issues.

In addition to providing more adequate protection of dissenting employees, therefore, we need more independent mechanisms for reviewing the issues raised - even when the issues are highly technical and therefore intimidating to the public or Congress. Here again professional societies can play an important role. Joel Primack and I have argued elsewhere that a greater involvement of the scientific community in independent policy analysis is necessary if we are to make our institutions accountable by peer review for the way which they develop and regulate technology - just as the individual scientist is held accountable by peer review for the way in which he does his science.[10]

Finally, it should be emphasized that the protection of responsible professional dissent is not an issue of concern to professionals alone. Increased protection of the professional freedom and responsibility of scientists and engineers in industry and government would most likely provide other social benefits. Our society can no longer afford to wait to correct a technological problem until it is possible to count the bodies. There are just too many dangers, some of which may not be visible before it is too late to avert a catastrophe. Furthermore, the longer society waits before it mandates the rectification of technological blunders, the more expensive and disruptive corrective actions become and the greater the reluctance of industry and government to make the necessary changes. This usually results in expensive, patched-up partial solutions instead of technologies designed properly from the beginning. Indeed, earlier identification and attention to technological problems could prevent the waste of tremendous amounts of intellectual energy in struggles over whether or not to change deployed technologies.

In summary, what is at issue here is the extension of the basic scientific freedoms enjoyed by scientists engaged in "pure" research to those professionals responsible for the development and regulation of the technologies spawned by that research.

## NOTES

1. A selection of the Codes of Ethics of professional societies are reprinted in Appendix B of Ralph Nader, Peter Petkas, and Kate Blackwell, Whistleblowing, (New York: Grossman, 1972). For an example of the employment guidelines which have recently been adopted by many large engineering and scientific societies, see the employment guidelines promulgated by the National Society of Professional Engineers (Professional Engineer, February 1973: 37-44).

2. James Olson, "Engineer Attitudes Toward Professionalism, Employment, and Social Responsibility," Professional Engineer, August 1972: p. 30.

3. For example, Frank and Edna Elkouri, How Arbitration Works, 3rd ed., (Washington, D.C.: Bureau of National Affairs, 1973); and Walter E. Baer, The

Labor Arbitration Guide, (Homewood, Illinois: Dow Jones-Irwin, 1974).

4. See e.g., Investigation of Allegations Relating to the Bureau of Drugs, Food and Drug Administration by The Review Panel on New Drug Regulation, Department of Health, Education and Welfare, 1977.

5. Nuclear Regulatory Commission's Safety and Licensing Procedures. Hearing before the U.S. Senate Committee on Government Operations, December 13, 1976.

6. See Federal Employee Disclosure Act of 1975, S. 1210, Hearings before the Subcommittee on Administrative Practice and Procedure of the Senate Judiciary Committee, April and June 1975.

7. Dudley Jackson, Unfair Dismissal, (Cambridge, England: Cambridge University Press, 1975).

8. Occupational Safety and Health Act of 1970 (Public Law 91-596, Sec. 11C); Federal Coal Mine Health and Safety Act of 1969 (P.L. 91-173, Sec. 110b); Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500, Sec. 507); Safe Drinking Water Act (P.L. 93-523, Sec. 1450); Toxic Substances Control Act of 1976 (P.L. 94-469, Sec. 23); Resource Conservation and Recovery Act of 1976 (P.L. 94-580, Sec. 7001); and the proposed Clean Air Act Amendments of 1976, S. 3219, Sec. 36.

9. Morton Corn, Assistant Secretary of Labor, Memorandum for the National Advisory Committee on Occupational Safety and Health: Discussion of OSHA's Program for Discrimination Investigations (November 15, 1976).

10. Advice and Dissent: Scientists in the Political Arena (New York: Basic Books, 1974; New York: New American Library, 1976).

## B. Commentary on "Professional Freedom and Responsibility:The Role of the Professional Society"

by Phillip I. Blumberg
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Frank von Hippel raises some fundamental questions about the freedom of scientists to challenge publicly the acts of their employers in response to personal judgments of the "social responsibility" of their employers' operations. The problem involves some of the basic questions of our time: How to preserve individual freedom in a society increasingly conducted by immensely large and powerful organizations? How to achieve greater accountability on the part of such large organizations and thereby strengthen (if not actually preserve) free institutions and a democratic society? How to make available to the public sufficient information to permit full and informed discussion of matters of public concern?

These problems are much more complex and their answers much more obscure than seems apparent from von Hippel's comments.

First, how can we determine the circumstances under which an individual employee's sense of ethical values or professional responsibilities (or political views) should prevail over the traditional duties of loyalty, obedience, and confidentiality to the employer and thereby justify the employee's unauthorized public disclosure of information about the employer's business or affairs?

At the outset, we must recognize that the law and practice in this area distinguish between government, and business or other organizations.[1] The Federal Constitution protects the rights of government employees (and of private employers whose affairs are so intertwined with governmental activities as to cause courts to conclude that their activities are the equivalent of governmental action). The Supreme Court has held that in the absence of proof of false statements knowingly or recklessly made, the government employee's right of freedom of speech provides protection against dismissal because of public statements critical of the agency or government pertaining to an issue of public importance.[2] The Constitution, however, is a protection only against governmental repression. It does not apply to private organizations, no matter how large or powerful or "public" in their operations (provided their activities are not the equivalent of governmental action). Similarly, the Federal and state Freedom of Information Acts establish guidelines to open wide areas of governmental operations to public scrutiny. No such statutes apply to non-governmental organizations.

For non-governmental organizations, development of the law is still in its early stages. Recognition of the extent to which the operations of large corporations affect us all and therefore in many respects present issues of important public concern is beginning to be reflected in judicial decision.[3]

We must first recognize the urgent need for painstaking analysis. Unless one would argue for an essentially anarchistic society where an employee would be free to disclose anything about an employer for any reason the employee might deem valid, then clearly we are committed to the principle that disclosure as such is not necessarily justified in all cases. We cannot avoid the difficult problem of defining a standard by which we can determine the circumstances under which disclosure in the particular case is proper.

The law of agency, which governs the relationship of employers and employees in non-governmental organizations, already offers some guidance in the resolution of these questions. It already recognizes that in some circumstances unauthorized disclosure is proper. These circumstances have been carefully defined and to date have been restricted to unauthorized disclosure of an employer's conduct that is:

a) criminal, or

b) fraudulent, or

c) "iniquitous" (i.e., near fraudulent).[4]

The law of agency similarly recognizes that in some circumstances an agent or employee is released from the traditional duty of obedience. These circumstances include not only the foregoing, but also those that would require conduct which would be contrary to the business or professional ethics of the agent or employee.[5]

As von Hippel recognizes, the development by professional organizations of standards for professional conduct involving such matters as disclosure or disobedience offers a fruitful avenue for accommodating the conflicting interests that make this problem so difficult. The law has already recognized the validity of this manner of resolution and the opportunity is available.

The problem of belling the cat remains, however: how do we define professional ethics in a way that will balance the opposing forces and be acceptable to the profession? It may be worthwhile to emphasize the importance of a resolution that commands the overwhelming support of the professional society in question. Unless the code has the widespread support of the profession, it loses its legitimacy; in this sense, it resembles the law itself. Codes or laws are live and survive only if freely supported without coercion by the society to which they pertain; if they do not possess such support and involve coercion or a significant dissenting group, they ultimately collapse.

Politicization of professional societies to encourage disclosure for the sake of political objectives involves several dangers. Increased divisiveness within the society, distraction from its other objectives, and its potential weakening or disappearance are one class of dangers. Another is the impairment of the respect which such a code will command not only among the professionals concerned but from the law itself.

In contrast, codes of ethical conduct that command the support of the great bulk of the professionals in question can be expected to command respect from the courts and provide considerable protection for professionals conducting themselves accordingly.

To achieve such support, the formulation of such codes must proceed in an atmosphere which will recognize and seek to reconcile different points of view, respect for the opinions of others, and dedication to commonly accepted values. In view of the very real advantages that could be achieved through the successful adjustment of conflicting interests, it is to be hoped that continued efforts to achieve greater individual freedom will proceed in such a manner.

* * * *

I wish to turn now to the immensely important distinction drawn by von Hippel between an employee's right to dissent and the substance of the dissent. The employee's exercise of his/her right as a citizen to discuss publicly matters of public concern that involve the employer raises questions about the social desirability of an employer's ability to control the after-hours conduct of employees in their roles as citizens. American traditions fully support such a freedom on the part of the employee, and as already noted, the Supreme Court has upheld this right for public employees. No court has yet so held in the case of a private sector (i.e., non-governmental) employee. Nevertheless, one may confidently expect that the law will ultimately recognize some legal redress for an employee discharged or otherwise penalized for such behavior. So long as the employee's acts are not malicious (i.e., made with the purpose of causing injury to the employer) or made for pecuniary advantage, the substance of the dissent is quite irrelevant. The public interest in the free discussion of ideas does not rest on the validity of the point of view expressed. Where dissent involves no unauthorized disclosure, the cost of sanctioning such conduct is low and of prohibiting it, high. Governments and non-governmental organizations alike can readily survive public criticism by some of their employees.

Dissent, however, will on occasion involve unauthorized disclosure. Indeed, without the disclosure, a dissent may be ineffective. However, this type presents a much more difficult problem. Organizations cannot function in anarchic fashion; some hierarchy and discipline are essential. Obvious considerations support the preservation of some information as confidential and the duty of an employee to treat it as such. The murky question is when the public interest in having information publicly available outweighs the genuine usefulness to the organization in keeping it confidential. In such a balance, the nature of the information, the nature of the organization, the employee's purposes in disclosure, the public purposes served by disclosure, the public loss in the event of non-disclosure, the organization's purposes served by confidentiality, and its loss from unauthorized disclosure all require painstaking evaluation. The substance of the dissent is obviously relevant to the evaluation.

A final comment. Von Hippel seeks to move beyond the employee's right to dissent as a citizen without unauthorized disclosure, and, as well, beyond the employee's right to make unauthorized disclosures under circumstances not yet

defined. He calls further for an external independent organization - apparently a court of science - to receive the employee's "indictment" and to try the employer. This suggestion is made in rough-hewn form ("bring about outside intervention"), and seems to imply the need to create a whole new legal system for the adjudication of scientific controversy in areas of public concern. Such a far reaching proposal should not, however, distract us from the important business at hand: the painstaking development of increased protection of the employee's right to speak out as a citizen on matters of public concern and the establishment of civilized standards defining the circumstances where the public interest would be served by unauthorized disclosure.

## NOTES

1. Leaks (i.e., unauthorized disclosure by governmental employees to the Congress, to the press, and to the public) are an accepted feature of the political scene, particularly when performed by governmental officials seeking to influence the decision-making process. It is not surprising that it has also been utilized by "dissenters" in government as a method of exposing or criticizing decisions or policies of which they disapprove. Unauthorized disclosure by non-governmental employees is less common and less accepted. The "public" dimensions of business are not yet recognized as an integral part of the political process.

2. Pickering v. Board of Education, 391 U.S. 563, 88 S.Ct. 1731, 20 L.Ed.2d 811 (1968). See Van Alstyne, "The Constitutional Rights of Public Employees: A Comment on the Inappropriate Use of an Old Analogy," 16 U.C.L.A. Law Review 751 (1969).

3. E.g., Herald Co. v. Seawell, 472 F.2d 1081 (10th Cir. 1972); Bangor & Aroostock R.R. v. Bangor Punta Operations, Inc., 482 F.2d 865 (1st Cir. 1973), rev'd, 417 U.S. 751 (1974).

4. Restatement of Agency (Second) Sec. 395, Comment f (1958); Initial Services Ltd. v. Pulterill, [1967] 3 W.L.R. 1032, 84 L.Q. Rev. 8 (1968); Gartside v. Outram, [1857] 26 L.J. 113.

5. The law of agency includes the body of common law (judge-made) decisions that pertains to the rights and powers of agents (of which employees represent one class) to act on behalf of their principals (or employers) and their duties to their principals.

   Section 385(1) of the Restatement of Agency (Second) (1958) imposes upon an agent "A duty to obey all reasonable directions" of his/her principal. Comment a notes:

   > In determining whether or not the orders of the principal to the agent are reasonable...business or professional ethics ...are considered... In no event would it be implied that an agent has a duty to perform acts which...are illegal or unethical...

## C. Scientific Society Involvement in Whistleblowing

by Rosemary A. Chalk
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In 1975, an ad hoc Committee of the American Association for the Advancement of Science (AAAS) published a report reviewing the changing social context of scientific freedom and responsibility. The report, prepared by John T. Edsall, emphasized the scientist's primary responsibility to the public interest and the potential conflicts between this responsibility and loyalty to an employer.

> Whistleblowing involves situations in which a scientist, engineer, physician, or other expert, becomes aware of hazards arising from some process, material, or product, or, on the other hand, becomes aware of possible improvements in technology or procedure that deserve to be adopted but are being neglected. Issues of public safety are frequently involved, and often the whistleblower works for the marketer of the process or product. Some may argue that persons with expert knowledge have a 'right' to release information in their possession, if such release is in the public interest. Others would say that it is the responsibility of such experts to release the information, even though they might prefer to remain silent. Both rights and responsibilities are clearly involved here, but it seems clear to us that the responsibilities are primary.[1]

As an example, the Edsall Report described a whistle-blowing incident involving three Westinghouse Electric Corporation engineers who had worked on the development of the San Francisco Bay Area Rapid Transit system (BART). The engineers were fired after they had disclosed information about safety defects in the BART braking system to members of the BART Board of Directors. After the firing, the California Society of Professional Engineers (CSPE) initiated an inquiry which publicized the issues involved in the engineers' action and which led to an investigation by the California State Legislature and further public discussion of the potential risks in the braking system. CSPE further attempted to file a legal suit on behalf of the engineers but were unable to follow through on this action.

In response to the BART case, the AAAS ad hoc Committee asked whether or not the professional societies should be expected to play a more visible role in supporting those scientists who act in the public interest. Their conclusions were:

> How active can, and should, professional societies be in actively fighting on behalf of their members who are attempting to defend the public interest? Most such societies have in the past remained aloof from conflicts of this sort, and have often taken the attitude that the purity of their devotion to the advancement of their respective sciences would somehow be contaminated if they entered the public arena to context such issues. We believe that such attitudes are no

> longer appropriate. The scientific community can no longer remain apart from the conflicts of our time, where so many technological decisions are being made that vitally affect the well-being of society. We are not proposing that professional societies should take public stands on large general political issues, such as the legitimacy of the Vietnam War; individual members of the societies, when their concern is aroused, should deal with these matters by other mechanisms. However, in matters directly related to the professional competence of members of the society, where the public interest is clearly involved, we believe that the societies can and should play a much more active role than in the past. They can deal with such issues by setting up committees of inquiry, in cases where a serious violation of scientific responsibility is suspected; by publicizing the results of the inquiry in professional journals, and, if necessary, in the more popular journals and in the news media; and by calling the matter to the attention of governmental bodies... They can on occasion launch lawsuits on behalf of members who have apparently suffered injustice when acting on behalf of the public interest.[3]

Since the BART case, other individual scientists and engineers have spoken out about the public health or safety dangers of products or services produced by their employers. Occasionally, whistle-blowing incidents have occurred within government agencies, when staff scientists and engineers from the regulatory agencies have appeared before congressional committees to testify about violations of internal agency regulations which may involve a threat to the public interest.

The personal histories of individuals who have chosen to serve the public interest at the expense of organizational loyalty emphasize the courage and commitment required to risk dismissal and other potential adverse actions by employers. At the present time, there are several efforts underway to mitigate adverse consequences through the support of the scientific community in general and the professional societies in particular. Whistle-blowing represents a particularly complex problem to a scientist because of a set of loosely defined interlocking responsibilities to professional colleagues, employers and the public, as well as to the discipline and to the concept of science itself. Traditionally, it has been assumed that these responsibilities are mutually supportive, if not identical, and thus in the past there have been relatively few efforts to identify which loyalties are primary.

In 1976, the AAAS created a new standing Committee on Scientific Freedom and Responsibility to develop further the findings of the Edsall Report. This Committee is broadly chartered to encourage the affiliated societies of AAAS to develop procedures supporting those scientists who act in the public interest. The Committee is also authorized to refer individual cases to the affiliates and to review cases where support might be provided directly by AAAS. After one year of Committee activities, it is difficult to judge whether or not the scientific societies will be willing to support those individual scientists who risk employer

loyalty in the public interest. But a few actions can be noted here:

1. Awareness of the problem. The whistle-blower is often viewed by many colleagues solely as a trouble-maker or publicity-seeking disgruntled employee. The first step in developing professional support, therefore, is to create a general awareness that the whistle-blowing problem transcends the circumstances of the individual caught up in a particular issue. To foster this awareness, the Committee on Scientific Freedom and Responsibility is sponsoring a symposium, "Whistle-blowing and Scientific Responsibility: The Management of Technical Dissent," at the 1978 AAAS Annual Meeting.[4] Symposium participants will examine two particular whistle-blowing incidents in government regulatory agencies (the Food and Drug Administration and the Nuclear Regulatory Commission) and the common aspects of these incidents. In addition, a subcommittee chaired by Frank von Hippel*, is also examining the general principles involved in whistle-blowing and alternative means of providing protection to individuals who raise important dissent issues.[5]

2. Development of professional support. In May 1977, H. Bentley Glass, chairman of the AAAS Committee, wrote to the executive directors and journal editors of the AAAS affiliated societies, encouraging them to take a more active role in the conflicts between scientific responsibility and the demands of private or public employers. The letter noted that, in particular:

> ...It would appear that the education of scientists and engineers in the issues of conflicting loyalties associated with scientific freedom and responsibility should be a major concern of professional societies. In fact, however, there is a surprising lack of discussion of these issues in the society journals and newsletters...The effect is to isolate the individual professional man or woman from the benefit of learning from the experiences of other colleagues in dealing with these situations... We urge you to open a forum in your journal or newsletter for a discussion of issues of scientific freedom and responsibility as it relates to your own profession.

More than twenty society directors and editors responded to Dr. Glass's letter indicating that they would welcome suggested references and materials that might be included in such a forum. Several societies, including The Institute of Management Sciences and the Human Factors Society, published the full text of the letter in their journals; others indicated that they would be willing to publish articles or editorials on this topic by the AAAS Committee members.

Not all responses were favorable, however. One society representative indicated that a discussion of the issues of scientific freedom and responsibility is "outside the purposes of our organization and our journals. If we had a newsletter or some such publication for ephemeral material, then such a forum might very well be appropriate." Other societies expressed a belief that such

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*See the article on this subject by Frank von Hippel in this issue of the Newsletter - Ed.

issues would be more appropriately discussed in general scientific publications such as Science.

3. Review of individual cases. This area has been the most difficult to develop. The CSFR has created a Subcommittee, currently chaired by Harold P. Green, to review individual cases of infringements of scientific freedom and responsibility. However, of the first fifteen cases reviewed by the Subcommittee, no one case seemed particularly relevant to the whistle-blowing issue. The cases primarily involved charges of interference with the publication of research data, interference by project supervisors with the research procedures of the claimant, and charges of dismissal or administrative discrimination (transfer, denial or promotion, etc.) on the basis of information disclosure without authorization. In none of these first fifteen cases, did the research data at question appear to be of particular relevance to the public interest. The Subcommittee is continuing to review cases and to develop additional experience in this area.

Other organizations are also developing interests in the whistle-blowing phenomenon and are exploring ways to protect individuals involved. Several civil libertarian groups, including the American Civil Liberties Union, are examining the phenomenon from the freedom of speech perspective; the Institute of Policy Studies in Washington, D.C., is studying it in relation to the accountability of government decision-makers; and some environmental public interest groups are using it as a catalyst for particular government program reforms.

The internal dynamics and changing values of the scientific community and the external social demands for professional and product accountability are having a direct impact on the work-ethic of the scientist, and both forces will shape the future environment of science. For those individuals caught up in the pressure of choice, however, the absence of clear guidelines within their professional societies or of mechanisms for appeal represent closed doors in the scientific community. The structural reforms may be a long time coming; the individual's choices are being made today.

It should be noted that one particular impediment to developing professional society involvement in the whistle-blowing process has been the belief within the scientific community that a whistle-blower must be right before earning community support. Because of this belief, more attention has been given to verifying the accuracy of findings and sources of data than to exploring the issue of dissent or developing protections for the dissenter. It should not be necessary for the whistle-blower to be 100% correct in order to gain support from his or her professional colleagues. The basis for scientific society involvement should not rest exclusively on whether the whistle-blower is right or wrong, but rather on whether the issue of dissent is important in terms of its effect on the public interest. If the issue is important, then developing procedures for airing both sides of a dispute will become a key element in providing support. Focusing solely on the accuracy of the claim has in the past completely blocked this development process.

Over twenty years ago, Michael Polanyi analyzed the effect of viewing ideas through the right/wrong filter:

> In the days when an idea could be silenced by showing that it was contrary to religion, theology was the greatest single source of fallacies. Today, when any human thought can be discredited by branding it as unscientific, the power exercised previously by theology has passed over to science; hence, science has become in its turn the greatest single source of error.[6]

To brand the whistle-blower's claim as "unscientific" divorces him from his most natural constituency, the scientific community. The net effect of this divorce is to isolate and bastardize the whistle-blower, and to inhibit the scientific community from providing visibility and support for those scientists who act in the public interest.

NOTES

1. Scientific Freedom and Responsibility, A Report of the AAAS Committee, prepared by John T. Edsall. (Washington, D.C.: American Association for the Advancement of Science, 1975) p. 5.

2 A case study of the ethical problems involved in the BART case is being prepared by Robert M. Anderson and his associates at Purdue University, under a grant from the NSF Ethics and Values in Science and Technology (EVIST) Program.

3. Scientific Freedom and Responsibility, op. cit., p. 39.

4. A copy of the symposium program may be obtained upon request to the author.

5. Articles by Dr. von Hippel on the need for protection of whistle-blowers have appeared in Physics Today (October 1977) and Technology and Society [the newsletter of the Committee on Social Implications of Technology of the Institute of Electrical and Electronics Engineers] (June 1977). See also the editorial by John Edsall, "Scientific Responsibility," Bioscience 29, September 1976: p. 531.

6. Michael Polanyi, Science 125, 1957: p. 480.

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Ashby, Lord, and Mary Anderson. "Studies in the Politics of Environmental Protection: The Historical Roots of the British Clean Air Act, 1956: III. The Ripening of Public Opinion, 1898-1952." International Sciences Review 2, September 1977: 190-206.

This article, last of three in a series on the campaign "to abate smoke in the cities of England," focuses on the political action, social activism, and environmental circumstances which combined to sway public opinion before the passage of the Act in 1956. At the end, the authors define the importance of "three prerequisites for successful legislation to abate smoke": 1) scientific knowledge and practicable technology, 2) practical means of surveillance, and 3) the need for politically practicable measures.

Bevan, William. "Science in the Penultimate Age." American Scientist 65, September/October 1977: 538-546.

Technology is not value neutral, it is a reflection of the culture; therefore, the emergence of a new social climate demands matching sensitivity in the scientific and engineering communities, and some adaptation of known attributes of scientific research to the changing social climate. Bevan makes suggestions for facilitating the "several roles of science and technology" in the more effective promotion of human welfare - including greater active involvement of scientists and scientific societies in the political process.

Block, N.J., and Gerald Dworkin, eds. The IQ Controversy: Critical Readings. (New York: Pantheon Books, 1976).

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The Work Hazards group of the BSSRS reports on its activities and analyzes the conflict between production and safety.

Bryant, Ian. "Vivisection: A Chapter in the Sociology of Victorian Science." Ethics in Science and Medicine 4, 1977: 75-86.

This paper - a case study of social conflict involving the ethics and public relations of science - examines the ethical controversy surrounding the practice of live animal experimentation in the years 1871-1900, a critical period for the establishment of physiology in Britain. In the hostile climate engendered by anti-vivisectionist agitation, physiologists and medical scientists were called upon to publicly defend their research methods. This paper examines the arguments used by scientists 'under pressure' as a result of their support of animal experiments, and offers some empirical evidence of the nature of ethical conflict in science. Implications are also drawn for the institutionalization of an emerging scientific specialty in adverse social circumstances.

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Report on a massive evaluation conducted from 1966-73 of the type and quality (results) of science education, as part of an international effort at educational assessment and comparison of newer science teaching methods, sex differences, and relation of achievement to various social and resource availability variables.

Computers and Society Bibliography. (Copies are available from Gerald L. Engel, Department of Computing and Statistics, Virginia Institute of Marine Science, Gloucester Point, Virginia 23062, at $2.30 per copy in the U.S., $3.30 mailed abroad).

A bibliography containing 2000 entries on "Computer Impact on Society" and "Computer Literacy Courses and Material", on microfiche.

Cornfield, Jerome. "Carcinogenic Risk Assessment." Science 198, 18 November 1977: 693-699.

Discusses the problem of assessing the risk, for humans, of agents found to be carcinogenic in animals, touching on statistical, scientific, and public policy considerations.

Cournand, Andre. "The Code of the Scientist and Its Relationship to Ethics." Science 198, 18 November 1977: 699-705.

Argues that the "norms" of science are in danger of serious distortion unless they are broadened to apply to the relations between scientists and non-scientists and are complemented by an "ethic of development".

Crosland, Maurice. "History of Science in an National Context." The British Journal for the History of Science, July 1977: 95-113.

In this Presidential Address to the British Society for the History of Science, Crosland assesses the advantages and disadvantages of various approaches to the history of science. While stressing the merits of "area studies" - "In the reception of scientific theories, national factors are of major importance" - Crosland also recognizes the dangers of parochialism and nationalism that may be inherent in that approach.

Davies, Duncan, Tom Banfield, and Ray Sheahan. The Humane Technologist. (New York: Oxford University Press, 1976).

An attempt to integrate social, economic, and philosophic thinking and theories into the design and engineering of technological systems.

Davis, Bernard D. "The Recombinant DNA Scenarios: Andromeda Strain, Chimera, and Golem." American Scientist 65, September/October, 1977: 547-555.

Discussion of the most prominent technical arguments for or against various methods and outcomes of Recombinant DNA research, particularly in the light of knowledge from epidemiology and evolutionary biology. Davis concludes that the three scenarios mentioned in the title are "product[s] of man's literary imagination and not his technology."

Deitchman, Seymour J. The Best-Laid Schemes: A Tale of Social Research and Bureaucracy. (Cambridge, Massachusetts: The MIT Press, 1976).

A first-person account of how and why the social science community and the Defense Department failed to establish a working accomodation in the 1960's.

Divergent objectives, clashing values and factionalism are manifest in the program of government-sponsored social research.

Dubos, Rene J. The Professor, the Institute, and DNA: Oswald T. Avery, His Life and Scientific Achievements. (New York: Rockefeller University Press, 1976).

A colleague recollects the accomplishments of a leading figure in molecular biology and assesses his role in the development of the field and the vitality of the Rockefeller Institute during his tenure there (1913-48).

Fields, Cheryl. "Women in Science: Breaking the Barriers." The Chronicle of Higher Education, 31 October 1977: 7-8.

Report of a recent AAAS conference on women in science, including a description of legislation planned by Senator Edward Kennedy which is designed to eliminate "cultural, educational, and institutional" blocks to full participation in science by women.

Fine, Jacob. "Rx: a peer review system for physicians." Bulletin of the Atomic Scientists 33, September 1977: 39-43.

"...There is a large amount of unsatisfactory care, which the medical profession...must face with more effective measures than those which are currently in operation." Fine proposes the establishment of an independent national board of peer review to monitor the performance of every practicing physician, arguing that the magnitude of the undertaking is warranted by the importance of its objectives.

Finocchiaro, Maurice A. "The Uses of History in the Interpretation of Science." The Review of Metaphysics, September 1977: 93-107.

Maintaining that "the most significant trend in recent philosophy of science has been one of historical orientation", the author distinguishes three separate aspects of "historical orientation" and presents a critical discussion of examples. Much of the analysis focuses on the work of Imre Lakatos and his followers.

Gilbert, John P., Bucknam McPeek, and Frederick Mosteller. "Statistics and Ethics in Surgery and Anesthesia." Science 198, 18 November 1977: 684-689.

Focuses on the ethical issues raised by controlled trials, in which patients are subjected, randomly, to different treatments. Analyzes published results of a series of randomized clinical trials dealing with innovations in surgery and anesthesia.

Goodfield, June. "Humanity in Science: A Perspective and a Plea." Science 198, 11 November 1977: 580-585.

Examines the meanings of "humanity in science", looks at the historical roots of contemporary "schisms", and argues that the science "profession's allegiance can no longer be to a methodological ethic alone."

Graham, Loren R. "Political Ideology and Genetic Theory: Russian and Germany in the 1920's." Hastings Center Report, October 1977: 30-39.

A comparative study of the development of eugenic movements, in the 1920's, in Weimar Germany and Soviet Russia in order to gain insights into "the connection between science and political values." Although "today it may appear that there is a natural alliance between eugenics and conservative, even fascist, sentiments," the analysis indicates that "that link was not logically preordained... and was not perceived in the early twenties by large numbers of radical social critics." Graham contends that "the question of whether theories have in themselves positive or negative value connotations cannot be answered on an abstract level. However, in a given historical situation...rival scientific theories always exist and have their influence within the context of given sets of social and political circumstances...Within those frameworks, rival scientific theories do have differentiated value implications, but they derive their value meaning much more from their relationships to these external factors than from anything inherent in the science."

Greenberg, Daniel S. "Lessons of the DNA Controversy." The New England Journal of Medicine, 24 November 1977: 1187-1188.

"The most erroneous, and trouble-spawning, lesson that could be drawn from the ...controversy over recombinant DNA research is that science brought misfortune upon itself by going public with what should have been a matter for in-house settlement." A cogent analysis of the controversy.

Hammerton, M. "A Fashionable Fallacy." New Scientist, 3 November 1977: 274-275.

The notion that scientific advances are determined by "social-and-economic factors" is dissected and found wanting.

Hay, Alastair. "Health and Safety 3 Years On." Nature 270, 10 November 1977: 91-93.

Traces the activities and troubles of the UK Health and Safety Commission - charged with securing the health, safety and welfare of people at work, and the public - since its inception in 1974.

Herbert, Victor. "Acquiring New Information While Retaining Old Ethics." Science 198, 18 November 1977: 690-693.

Describes numerous cases to illustrate some of the ethical and legal problems of human experimentation.

Hoffmann, Banesh. "Unexpected Rewards." American Journal of Physics 45, September 1977: 787-794.

A host of anecdotes presented to convince researchers of the need to "search the archives" for evidence of the emotion and the other human values inherent in the creative processes of science.

Icerman, L. "Perspective on the Worldwide Debate and Public Opinion on Nuclear

Power." Science & Public Policy, October 1977: 465-482.

Reviews the development and current status of the nuclear debate in the United States and selected European countries.

"Intergovernmental Relations and the Environment in West Germany and the United States." (Bloomington, Indiana: Institute of German Studies, 1977).

This monograph contains the proceedings of a conference held in April 1977 and includes papers on the regional organization of the EPA in the U.S. as well as on the relation of Bund and Lander to environmental protection in Germany, thus enabling some interesting international comparisons. Available for $1.50 from the Institute, Ballantine Hall 666, Indiana University, Bloomington, Indiana 47401.

"Kennedy Defends FDA Policies and Actions." Chemical and Engineering News 55, 12 September 1977: 21-23.

Interview with FDA Commissioner Donald Kennedy on the current scientific and public policy issues facing his agency; his assessment of the FDA performance to date and views on future actions.

King, Christine. "China - a new role for science." New Scientist, 6 October 1977: 32-33.

Recent pronouncements by the Chinese government indicate a new emphasis on scientific research and a turn toward more traditional Western science.

Knowles, John H., ed. Doing Better and Feeling Worse. (New York: W.W. Norton and Company, Inc., 1977).

Subtitled "Health in the United States", this is a volume of 20 essays by physicians, economists, and political and social scientists. Their articles deal with a wide range of problems and questions: the soaring costs of medical care, medical manpower and training, biomedical research, ethics, delivery systems, technology, insurance, and the meaning of 'health'. Contributors are: Ivan Bennett, Jr., Philip Berger, Daniel Callahan, Merlin DuVal, Robert Ebert, Leon Eisenberg, Renée Fox, Donald Fredrickson, Eli Ginzberg, Beatrix Hamburg, David Hamburg, Herbert Klarman, John Knowles, Walsh McDermott, Stanley J. Reiser, Julius Richmond, David Rogers, Ernest Saward, Lewis Thomas, Aaron Wildavsky.

Mahoney, Michael J. Scientist as Subject: The Psychological Imperative. (Cambridge, Massachusetts: Ballinger Press, 1977).

The author attempts to examine the prevalent popular image of the scientist in view of known and measured attributes of real scientists, but he goes beyond simple comparison in his assertion that "popular misconceptions of the scientist significantly threaten the very foundations of scientific knowledge." He argues that recognition by scientists of the falliability of many of these images - as manifested in actions and attitudes within science - is imperative to reform of science itself. [n.b. - in a brief appendix, the author reports

on his survey in which "almost half of the scientists reported knowledge of at least one instance of data suppression in their field," as well as other intriguing but skimpily-reported results.]

Mangun, William Russell. "The Public Administration of Environmental Policy: A Comparative Analysis of the United States and West Germany." (Bloomington, Indiana: Institute of German Studies, 1977).

A comparison of governmental and institutional arrangements for environmental quality monitoring and control. Available for $2.50 from the Institute, Ballantine Hall 666, Indiana University, Bloomington, Indiana 47401.

Masters, William H., Virginia E. Johnson, and Robert C. Kolodny, eds. Ethical Issues in Sex Therapy and Research. (Boston, Massachusetts: Little, Brown and Company, 1977).

Based on the proceedings of a conference devoted to the identification and discussion of fundamental ethical issues in therapeutic and investigative approaches to human sexuality. Special sections on the historical background, theological perspectives, informed consent, and confidentiality commend this book to ethicists in many fields. The insights and attitudes of sex researchers and therapists are of particular interest because of the public and published controversy which can often attend their work. Recent heightened efforts by professional sex therapists and counselors to regulate the training and practice in their field through state legislation and public education have demonstrated the importance of discussion of these issues within the field and, as Kolodny points out, of analysis of current public attitudes to both sex research and therapy.

McElheny, Victor K. "Coast Concern Plans Bacteria Use for Brain Hormone and Insulin." New York Times, 2 December 1977: D1, D9.

A California company has announced plans for commercial use of the techniques of gene splicing (genetic recombination). The firm has indicated that the manufacturing operation will follow the guidelines imposed on Federally supported research laboratories by the National Institutes of Health.

Medawar, P.B. "Fear and DNA." The New York Review of Books, 27 October 1977: 14-20.

An essay-review of three recent books on the recombinant DNA controversy by June Goodfield, Michael Rogers, and Nicholas Wade. Professing to "very deeply sympathize with laymen and legislators who are trying to make sense of this whole strange farrago of pipe dreams and nightmares", Medawar nonetheless makes the charge that "for their excess of fearfulness, laymen have only themselves to blame and their nightmares are a judgment upon them for a deep-seated scientific illiteracy..."

Milch, Jerome. "The Politics of Technical Advice." Administrative Science Quarterly, September 1977: 526-535.

An essay-review of six books - some new, others published in 1974 and 1975 - which analyze different aspects of the impact of technical experts on the formation of public policy.

Milgram, Stanley. "Subject Reaction: The Neglected Factor in the Ethics of Experimentation." Hastings Center Report, October 1977: 19-23.

Noting that "many experiments in social psychology cannot be carried out if the subject knows about the experiment before hand", Milgram attempts to reconcile the need for informed consent ["the cornerstone of ethical practice in experimentation with human subjects"] with the use of "deception" ["technical illusions"] in some psychological experiments.

Morse, Philip M. In at the Beginnings: A Physicist's Life. (Cambridge, Massachusetts: The MIT Press, 1977).

Morse does not succumb to the common temptation facing scientists writing autobiographies. This is a narrative of his life, full of facts and incidents, but there is little exposition or interpretation on what it all may mean to society. He knows what it meant to him; for us, he says it best: "My task in this narration has been to tell my story as frankly as possible, in the hope that the reader can sort out the pattern and the message." And later, "For those who like exploration, immersion in scientific research is not unsocial, is not dehumanizing; in fact, it is a lot of fun." Pithy, succinct, and educational.

Mullins, Carolyn J. A Guide to Writing and Publishing in the Social and Behavioral Sciences. (New York: John Wiley and Sons, 1977).

A masterful compilation of information and instructions on writing, revising and publishing technical articles and books. Extensive cross-indexing and meticulous organizational details make this book more useful than conventional grammar and style books and its breadth of discussion (from how to negotiate with a publisher to how to deal with sex-linked pronouns) makes it useful to academicians, students, bureaucrats, office staff members - any person in a technical field who has need of a reference for writing, typing, or publishing a book, article, dissertation, or report.

National Academy of Sciences. Research with Recombinant DNA. (Washington, D.C.: National Academy of Sciences, 1977).

Based on an Academy forum held in Spring, 1977, the volume contains an explanation of the fundamental principles of recombinant DNA research, as well as discussions of scientific and public policy questions. Contributors include Maxine Singer, Daniel Callahan ("The Involvement of the Public"), Erwin Chargaff, Daniel Nathans, Paul Berg, Robert Sinsheimer, Sir John Kendrew ("Research with Recombinant DNA in Europe"), Bernard Davis, and Stephen Toulmin ("The Research and the Public Interest").

National Academy of Sciences. Science, An American Bicentennial View. (Washington, D.C.: National Academy of Sciences, 1977).

A selection of commentaries drawn from a series of Academy Forums held in 1975-76 in celebration of the Bicentennial. The 25 selections, typically 4-5 pages in length, are organized around three themes: "Scientific Theories and Social Values", "The Citizen and the Expert", and "The Use of Knowledge: Frontier Expansion or Inward Development."

Nelkin, Dorothy. Technological Decisions and Democracy: European Experiments in Public Participation. (Beverly Hills, California: SAGE Publications, 1977).

Based on field research in Sweden, Austria, and the Netherlands, this comparative study analyzes citizens' efforts to influence policies for science and technology, and government initiatives to structure more direct public involvement in policy making. The focus is on changing forms of participation in three technical policy areas: physical planning, nuclear energy policy, and science research policy. Nelkin's aim is to illustrate the ways in which national political constraints and traditional assumptions shape the commitment to and forms of citizen participation.

Nelkin, Dorothy, and Michael Pollak. "The Politics of Participation and the Nuclear Debate in Sweden, the Netherlands, and Austria." Public Policy 25, No. 3, Summer 1977: 334-357.

Compares the efforts of three countries to broaden public involvement in energy decisions. The comparison reveals how participatory reforms develop as a means to win acceptance of controversial government policies; how the shape of the reforms reflects different political expectations about the function of citizenship and the role of government; and how perceptions of the problems of participation vary according to national political objectives.

Noble, David F. America by Design: Science, Technology, and the Rise of Corporate Capitalism. (New York: Alfred A. Knopf, 1977).

Noble provides a useful history of the interaction of U.S. science and industry, and of the complex development of engineering education and professional accreditation in engineering. Detailed attention to the corporate control of patents and the role of the individual inventor vis-a-vis the corporation combine with accounts of the rise of "Scientific Management" to add depth and additional examples of the author's theses. The book outlines how the rise of science-based industry, the development of technical education, and the emergence of the professional engineer each reflected and contributed to the process of technology as corporate social production.

Nunn, Clyde. "Is There a Crisis of Confidence in Science?" (editorial) Science 198, 9 December 1977: 795.

Although recent surveys show that less than a majority of Americans have "a great deal" of confidence in science, other data suggest that "ambivalence, not rejection, best characterizes public attitudes". Date also indicate that "fewer science-related items appear in newspapers than the interest ratings indicate should be there..."

Patten, Steven C. "Milgram's Shocking Experiments." Philosophy 52, No. 202, October 1977: 425-440.

A reexamination of the controversial obediance experiments designed and conducted in the early 1960's by social psychologist Stanley Milgram.

"Physicists and Washington." Physics Today 30, August 1977: 23-48.

Special series of articles which document some of the current measures of providing scientific advice to the government:
1) Mike McCormack, "Legislating the Nation's Science Business" - how scientists can participate;
2) William A. Nierenberg, "What Physicists Can Do in Washington" - history and future directions;
3) Richard A. Scribner and Mary L. Shoaf, "Four Years of Congressional Science Fellows" - score card for the APS Program;
4) Allan Hoffmann, Thomas Moss, and Haven Whiteside, "Helping Shape Legislative Policy" - former Fellows describe what it's like inside Congress.

Reilly, Philip. Genetics, Law, and Social Policy. (Cambridge, Massachusetts: Harvard University Press, 1977).

In a book which does not require special background in either law or genetics, Reilly explores the ethical and legal implications of what he calls "negative eugenics" - that is, the U.S. commitment to reducing the incidence of human genetic disease. Through a study of genetic screening laws and the provisions for large data banks of information about the genetic constitution of individuals, this book attends to some of the most interesting and vital questions of this new interface between science, the law, and society.

Ritterbush, Philip C. "The Public Side of Science." Change, September 1977: 26-33, 64.

Why do so few scientists devote time and effort to communicating knowledge to the general public? Ritterbush argues that it is partly because scientists assume that the knowledge is being disseminated by other institutions: print journalism, the broadcast media, secondary-level science education, and museums. Finding the performance of these institutions wanting, the author suggests alternative mechanisms.

Rodman, John. "The Liberation of Nature?" Inquiry, Spring 1977: 83-145.

A thoughtful essay-review of two books which espouse the position that Nature (including but not restricted to animals) has, or should be given, rights: Christopher Stone's Should Trees Have Standing?: Toward Legal Rights for Natural Objects (Avon Books, New York, 1975); Peter Singer's Animal Liberation: A New Ethics for our Treatment of Animals (New York Review and Random House, New York, 1975).

Russett, Cynthia Eagle. Darwin in America: The Intellectual Response, 1865-1912. (San Francisco, California: W.H. Freeman and Company, 1976).

Russett sees Darwin as one of the "great synthesizers", in the sense of his gathering and organizing of the data but also in his consequent "radiant" effect on society and science. This essay describes that effect on certain American intellectuals as seen in the public record of the time. In particular, Russett focuses on Pierce, William James, Henry Adams, Veblen and the writers Norris, Whitman, and London. A crisply written account with many subtle insights, this book should appeal to a wide variety of readers.

"Science Crisis in European Societies?" (conference). Science & Public Policy, October 1977: 397-453.

Four key papers presented at a symposium on "Science Crisis in European Societies" held in Brussels in June 1977. "Metamorphosis of Science" by I. Prigogine; "Crisis of Science, Crisis of Society" by Jean-Jacques Salomon; "Science Today and Its Environment" by Peter Weingart; "Turning Points in the Relations of Science with Society" by Jerome R. Ravetz.

Searle, G.R. Eugenics and Politics in Britain, 1900-1914. (Leyden, the Netherlands: Noordhoff, 1976).

An analysis of the eugenics movement in the context of contemporaneous British politics. (See also the review by Ruth S. Cowan in Science 198, 4 November 1977: 498-499).

Shapley, Deborah. "Research Management Scandals Provoke Queries in Washington." Science 198, 25 November 1977: 804-806.

Sparked by revelations of abuse and questionable practices, federal agencies are giving close scrutiny to grants and contracts to universities, hospitals, and other research institutions.

Sherwell, Chris. "Harmony of Practice." Nature 270, 10 November 1977: p.94.

Reports continuing European initiatives to control recombinant DNA research.

Smith, R. Jeffrey. "Electroshock Experiment at Albany Violates Ethics Guidelines." Science 198, 28 October 1977: 383-386.

The State University of New York at Albany has been charged with violating federal and state regulations which require all research on human subjects to be approved, prior to experimentation, by an institutional ethics committee. Attorneys for the university have admitted that, in some cases: projects were not submitted for approval; proper consent was not obtained from participants; and participants were not given a fair explanation of risks.

Steinfels, Margaret O'Brien. "Ethics, Education, and Nursing Practice." Hastings Center Report 7, August 1977: 20-21.

Report of a conference on teaching ethics in a nursing context, sponsored in Spring 1977 by the Institute of Society, Ethics and the Life Sciences.

Studer, Kenneth, and Daryl E. Chubin. "Ethics and the Unintended Consequences of Social Research: A Perspective from the Sociology of Science." Policy Sciences 8, 1977: 111-124.

Arguing that "successful" social science requires the development of a "social ethic" or "sense of research responsibility", this article examines impediments to ethical reflection in sociology, with particular emphasis on sociology of science.

"Symposium on Research Ethics." Public Opinion Quarterly, Spring 1977: 100-112.

Includes an article, "Invisible Coding of Survey Questionnaires" by J.P. Dickson, et al., and six commentaries by persons active in or knowledgable about survey research. According to the Editor's Note: "This article, unlike most POQ articles, is an expression of opinion rather than a report of research findings. Because of the increasing concern about ethical issues in research on the part of the public, government, and researchers themselves, we decided to print it and to invite comments from people who have been involved...with public opinion research including mail surveys or with ethical and legal issues concerning research."

Tukey, John W. "Some Thoughts on Clinical Trials, Especially Problems of Multiplicity." Science 198, 18 November 1977: 679-684.

An overview of statistical and ethical issues in the design and analysis of clinical trials, with particular emphasis on problems of multiplicity.

Wade, Nicholas. "Medical Research in England: New Director Seeks to Boost Morale." Science 198, 9 December 1977: 1021-1022.

The new director of the UK's Medical Research Council, J.L. Gowans, is espousing a scientist-oriented research policy, with expenditures independent of social and political pressures.

Wade, Nicholas. "Scandal in the Heavens: Renowned Astronomer Accused of Fraud." Science 198, 18 November 1977: 707-709.

"...a devastating blow has been struck to the geocentric theory of the universe" concludes Wade, in describing a current dispute about the legitimacy of the data reported by Claudius Ptolemy around A.D. 150.

Walsh, John. "Social Studies of Science: Society Crosses Disciplinary Lines." Science 198, 18 November 1977: 706-707.

An account of the October 1977 meeting of the Society for Social Studies of Science (4S).

Walsh, John. "U.S.-West European Cooperation in Science Seems to be Declining." Science 198, 14 October 1977: 175-177.

Preliminary evidence suggests that the two-way scientific traffic between the

U.S. and Western Europe is slackening. The situation is causing concern on both sides of the Atlantic and efforts to get a statistical picture of the problem are underway at the National Academy of Sciences, the Royal Society in Britain, and by several federal agencies.

Walters, LeRoy, ed. Bibliography of Bioethics, Volume Three. (Detroit, Michigan: Gale Research Company, 1977).

This is the third in a series of annual volumes on English language materials - print and non-print - on topics of bioethics. Volume Three covers more than 1500 documents from 1973 through 1976, most of which were published in 1975. Included in the volume is a Bioethics Thesaurus, an index language to facilitate the translation of concepts into searchable terms.

Wax, Murray L. "Fieldworkers and Research Subjects: Who Needs Protection?" Hastings Center Report 7, August 1977: 29-32.

Analysis of problems of informed consent in group research.

Wolman, M. Gordon. "Interdisciplinary Education: A Continuing Experiment." Science 198, 25 November 1977: 800-804.

Describes nine years of experience with a graduate level interdisciplinary program dealing with the environment. Despite the strong rationale for interdisciplinary studies, such educational efforts confront "major difficulties in virtually every area related to the process of education". The author describes and analyzes problems of philosophy (defining the core of study), faculty, students, curriculum, research, money, and evaluation.

Wright, Susan. "Recombinant DNA Technology: Who Shall Regulate?" Bulletin of the Atomic Scientists, October 1977: 4-5.

Wright analyzes regulatory legislation under consideration by the House and Senate in Fall, 1977, and draws on the British experience for comparison.

## INSTRUCTIONS TO CONTRIBUTORS

The Newsletter on Science, Technology & Human Values is a quarterly review of issues, actions and educational activities concerning the ethical implications and social consequences of science and technology.

Editorial coverage includes:

- Ethical problems and value conflicts generated by contemporary and historical developments in the natural and social sciences and technology;

- Ethical issues and problems which arise in the course of scientific research and technological development, including those encountered by scientists and engineers in their professional capacities;

- The impact of changing ethical and social standards on the conduct of science and technology - e.g., on the establishment of research priorities and policies, and on the regulation and application of research;

- Issues pertaining to the public understanding of science and technology.

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Readers are encouraged to submit: NEWS ITEMS (announcements of meetings, publications, activities, educational programs, fellowship opportunities); BIBLIOGRAPHIC ENTRIES; LETTERS; RESEARCH REPORTS; and ARTICLES.

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For the APRIL issue - March 7
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RESEARCH REPORTS describe on-going or recently completed projects in the subject-areas described above; appropriate length is 5-10 pages, double-spaced.

ARTICLES and COMMENTARIES ON ARTICLES are refereed. ARTICLES should be limited to 25 pages, double-spaced; COMMENTARIES should be no longer than 10 pages, double-spaced. To facilitate blind-review, authors are requested to place identifying information on a separate sheet. Papers should be submitted in duplicate. Prospective authors are invited to communicate with the editors prior to formal submission of articles.